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The Effect of Time Pressure on Auditor Attention to Red Flags in a Dual-Task Environment.

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THE EFFECT OF TIME PRESSURE ON
AUDITOR ATTENTION TO RED FLAGS
IN A DUAL-TASK ENVIRONMENT

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Accounting

by
Robert L. Braun
B.S., Kansas State University, 1988
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DEDICATION

To Susan, Tommy, Paul, and Jake,
for your enduring support, patience,
inspiration, perspective and love...

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As with any project of this length, there have been numerous individuals who have provided assistance and support on this project. The support has come in many forms--financial, technical, and emotional. I will attempt to acknowledge all of those who have extended support on this project. Undoubtedly there will be some omissions, however, and I apologize for those.

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ABSTRACT

Motivated by recent attention given to the independent auditor's role in detecting red flags, this dissertation investigates the effect of time pressure on auditors' attention to red flags in the auditing environment. In so doing, the earlier work of McDaniel [1990] investigating the effects of time pressure on the auditor's ability to execute auditing tests of details is extended. Authoritative sources indicating that red flag detection is performed as a subsidiary task in a multi-task auditing environment are presented. The Easterbrook hypothesis, which holds that a progressive reduction in the range of cue utilization accompanies increases in arousal, provides theoretical support for the prediction that under time pressure auditors' attention will become more focused on the primary task of executing auditing tests of details at the expense of attention given to the subsidiary task of red flag detection.

McDaniel's [1990] test instrument was modified by seeding red flags within the text and data associated with a hypothetical audit client. This instrument was administered to practicing independent auditors at varying levels of time pressure. Results consistent with the theoretical expectations are presented. The results suggest that auditors under high time pressure may be less likely to attend to and understand red flags than auditors under low time pressure.

Furthermore, the results suggest that the performance decrements associated with the red flag detection task may be observed at a lower level of time pressure than decrements in the accuracy with which auditing tests of details are executed.

CHAPTER 1

INTRODUCTION

Purpose of the Research

The purpose of this research is to investigate the effect of time pressure on the cognitive processes of auditors. Specifically, this dissertation compares the extent to which auditors under differing conditions of time pressure are able to attend to red flags¹ while executing detailed tests related to a client's inventory system. The belief that auditors have a responsibility for detecting and investigating red flags that they are not meeting motivates this research. [National Commission on Fraudulent Financial Reporting, 1987, p.25]

Building upon McDaniel [1990], a study that demonstrated the effects of time pressure on the execution of audit tests

¹ The term "red flags" is a colloquialism which refers to what auditing standards call "factors influencing audit risk." [AICPA 1992, AU 316.09] In the absence of a formal definition of the term, there is some variability in its application and interpretation. Conditions within an entity which allow irregularities to occur, factors which motivate individuals to commit irregularities, and attitudes or ethical standards which may predispose individuals to engage in irregularities are generally recognized classifications of red flags. Indicators present in accounting data such as unusual trends, sizes or relationships between amounts may also be red flags. The presence of a red flag does not necessarily mean that a financial fraud has occurred. It simply means that the characteristic has appeared in post-mortems of known financial frauds and should be treated with skepticism. Failure to detect a red flag is not necessarily the same thing as a failure to detect a fraud. If no fraud is present, one would not necessarily expect an auditor to comment on the presence of a red flag. This study addresses the ability of auditors to detect and investigate red flags in an audit setting in which the presence of several red flags, when considered in aggregate, indicates that there is a high probability that financial fraud is present.

of details in a single-task setting, the proposed research examines time pressure's effects on both the primary cognitive task of executing detailed audit tests and the subsidiary cognitive task of being attentive to the red flags. This research demonstrates that the task of attending to red flags is, to a large extent, executed in such a dual cognitive task² environment. Throughout, I rely upon research in psychology to explain and predict the effects of time pressure on auditor performance. Results are, on the whole, supportive of the predictions made.

Overview

Auditors are engaged to render opinions on financial statements taken as a whole, and they do so through gathering sufficient, competent evidential matter that bears upon the reasonableness of managerial assertions contained within those statements. Such reasonableness is understood as, primarily, the absence of material misstatement of the financial statements taken as a whole.

Two corollaries of this overriding objective, the rendering of an opinion, are: (1) the possible discovery of errors, irregularities, and even illegal acts; and, (2) the design of audit procedures that assist in such possible discoveries as well as the formation of an opinion on the

² The concept of dual cognitive tasks or dual task environment is unrelated to the auditing concept of dual purpose testing discussed in auditing literature [AICPA, 1992, AU 350.44].

financial statements.³ The AICPA Professional Standards require attention to each of these corollaries:

The auditor's assessment of the risk of material misstatement of the financial statements requires the auditor to understand the characteristics of errors and irregularities . . . and the complex interaction of those characteristics. Based on that understanding, the auditor designs and performs appropriate audit procedures and evaluates the results [AICPA 1992, AU 316.06; emphasis added].

Along with going concern problems, auditor interest in errors and irregularities have become popularly known as "red flags" that follow from audit procedures. It seems that auditors are engaged in multiple tasks simultaneously; that is, while the expression of an opinion on the financial statements remains the focus of the audit, auditors are obligated to keep other goals and objectives, like red flag

³ Auditing standards define errors as "unintentional misstatements or omissions of amounts or disclosures in financial statements" [AICPA, 1992, AU 316.02, emphasis in original]. With regard to irregularities, the following guidance is given:

The term irregularities refers to intentional misstatements or omissions of amounts or disclosures in financial statements. Irregularities include fraudulent financial reporting undertaken to render financial statements misleading, sometimes called *management fraud*, and misappropriation of assets, sometimes called *defalcations*. [AICPA, 1992, AU 316.03 emphasis in original]

In either case the auditor's responsibility for detection is extended only to situations where the error or irregularity is material. Materiality is defined as follows, "the magnitude of an omission or misstatement of accounting information that, in light of surrounding circumstances, makes it probable that the judgment of a reasonable person relying on the information would have been changed or influenced by the omission or misstatement." [AICPA, 1992, AU 312.06]. All subsequent discussion of errors and irregularities assumes materiality.

detection, in mind as they perform the procedures necessary to support the audit opinion.

This is not to say that red flag detection occurs exclusively in a dual cognitive task environment. There are audit procedures specifically concerned with errors, irregularities such as financial fraud or defalcation. Most often, however, the objective of these procedures is to assess the likelihood that these situations exist and adjust audit tests of details accordingly. For example, senior members of an audit team may undertake specific procedures to determine the various exposure areas in the audit. These exposure areas may be communicated to other audit team members through discussions, an audit planning memo, or audit program changes. It is generally only through testing the details of transactions and balances, which may or may not be done by senior audit team members, that determinations as to whether errors or irregularities have occurred can be made, however.⁴ In this general case, the auditor responsible for executing the tests of details would be advised to keep in mind the red flags identified and communicated previously and to be attentive to additional indicators present in the data. Put

⁴ The example presented here was a general case. There may be individual cases where the specific procedures aimed at assessing the likelihood of each of the various situations provide strong evidence that an error or irregularity exists. In such an event a directed investigation of the matter may be undertaken to gather evidence exclusively for the identification of an error or irregularity such as financial fraud or defalcation.

cryptically, audit procedures serve several different modalities of audit judgment and decision.

Audit activity is made more difficult when one recognizes that audit effort is a scarce resource. Most obviously, audit firms exist primarily to make a profit, and that profit-focus gives rise to time budgets placed upon auditors. For practical and theoretical reasons that will be explained subsequently, such budgets may cause auditors to subordinate red flag detection -- a task not directly associated with these audit procedures -- to tasks for which the time budget holds them directly accountable. Substantive tests of details of balances would be one example of these latter tasks. In the language of cognitive psychology, auditing seems to be a "dual-task" paradigm where substantive tests of details would be considered primary cognitive tasks while red flag detection would be considered a secondary cognitive task.

The purpose of this dissertation is to investigate how increasing levels of time pressure mediate the performance of these two types of audit tasks. While others have studied the effect of time pressure on the performance of a single audit task, this study is to my knowledge the first to investigate the effect of time pressure on multiple audit tasks [Rhode, 1978; Alderman and Deitrick, 1982; Lightner, Adams, and Lightner, 1982; Lightner, Leisenring, and Winters, 1983; Cook and Kelly, 1988; and Kelly and Margheim, 1990; Waggoner and Cashell, 1991]. In addition, McDaniel [1990] has established

that time pressure influences the efficiency and effectiveness of auditors. The theoretical expectation (discussed and rationalized subsequently) is that at some level of time pressure that places auditors beyond the optimal level of arousal (or stress), time pressure will have a more detrimental effect on red flag detection than it will on the execution of substantive tests.

This theoretical expectation is a special case of a more general psychological finding that high levels of arousal force the range of attention toward primary tasks and away from secondary tasks [Eysenck, 1982; Kahneman, 1973]. At a practical level, conditioned by the increased competitiveness of the audit market, this psychological effect may explain why some have claimed that auditors have failed with regard to identifying and pursuing red flags related to financial fraud and other irregularities [National Commission on Fraudulent Financial Reporting, 1987; Public Oversight Board of the SEC Practice Section, AICPA, 1993; Board of Directors of the American Institute of Certified Public Accountants, 1993]. That is, if increased competitiveness gives rise to more time pressure; and, if such time pressure results in less attention to secondary tasks, then there may be a psychological reason for "failures" with respect to red flag detection.

Outline of Dissertation

In the remainder of the chapter, I discuss the institutional issues that motivate this dissertation.

Following that, I discuss the theoretical arguments that motivate an interest in the relation between dual-tasks and arousal. Chapter III explains the methods of inquiry. Analysis of the data and discussion of the results is detailed in Chapter IV. Chapter V concludes the dissertation with discussion of the implications of the study for auditors and audit institutions.

Motivation

Prominent researchers in cognitive accounting research have suggested that the field lacks an understanding of the context in which decisions are made [Hogarth, 1991; Ashton, 1990; Johnson and Kaplan, 1991; Ashton, Kleinmütz, Sullivan, and Thomassini, 1988]. As such, they have recommended that future research in the area take into consideration more features of the decision-making environment.

Presumably, the purpose of cognitive research in auditing is to 1) advance the understanding of how auditors perform judgment and choice tasks, 2) provide some measurement of how well they perform these tasks, and 3) suggest ways of improving performance [Hogarth 1991]. Hogarth advises that, although researchers in the area have made important contributions toward the attainment of each of these three goals, the degree to which they can be achieved is limited without considering the conditions under which auditors operate. Although such considerations would be inappropriate

for a less developed area of study, they are necessary for progress in more established disciplines:

In the final analysis, however, audits take place in a larger and more complex context than those portrayed in most CRA [cognitive research in auditing] studies. It is my belief that CRA is now mature enough to consider the complexities of that context. [Hogarth, 1991, p. 288]

Ashton et al. [1988, p. 104] along with Dopuch [1992] and Lord [1992] make a similar claim:

While some attention has been devoted to cognitive issues outside of the input-output paradigm (e.g., memory and information search), the existing research largely has ignored the group, organizational, professional, and market contexts within which many audit decisions are made, including issues related to incentives, learning, feedback, and competition.

This study, as with McDaniel [1990], makes the market context of time pressure on auditors experimentally salient and is thus responsive to such claims and appeals. Interestingly, Hogarth [1991, p. 288] identified time pressure as an example of such a contextual factor -- "What, for example, are the effects of time pressure and/or the riskiness of different types of audits?" Although time pressure has been found to have significant effects on the execution of auditing procedures, Hogarth's comments indicate that little is known about its effects on the cognitive processes of auditors. Cognitive processes are, of course, the object of inquiry in cognitive accounting research.

Motivation for this dissertation does not emanate exclusively from the academic community, however. The motivating conditions are found in the practice of auditing

itself. Particularly, the relevance of the challenge facing the profession to become more active in its role of detecting red flags serves as a primary motivating factor. The significance of this challenge is evidenced by a recent statement of the Board of Directors of the AICPA [1993, p. 2], "The public looks to the independent auditor to detect fraud, and it is the auditor's responsibility to do so."

While this is the view of the Board of Directors of the AICPA, it may not be shared by everyone in the profession. There are those who may claim that auditors are not and should not be responsible for financial fraud detection. They generally point out that Statement on Auditing Standards (SAS) No. 53 disclaims full responsibility for financial fraud detection with statements emphasizing the audit concept of reasonable rather than complete assurance. The argument is made that financial frauds are often complex and very difficult for auditors to detect with standard procedures. These arguments, while valid, do not account for other sections of SAS No. 53 that identify several red flags associated with errors and irregularities with the purpose of encouraging the auditor to consider them in planning, designing, and executing audit procedures. Clearly, auditing standards indicate the importance of attending to red flags as indicators of potential errors or irregularities in the client's records. Recent statements of the Board of Directors of the AICPA, the Public Oversight Board of the SEC Practice

Section of the AICPA, the National Commission on Fraudulent Financial Reporting and researchers who have proposed models to improve auditor detection and interpretation of red flags [Loebbecke, Eining, and Willingham, 1989] provide support for the belief that auditors are responsible for the detection of financial fraud. External auditors' role as independent investigators perhaps makes them more responsible, at least in theory, for the detection of financial fraud than internal oversight functions. As functional units within many clients, internal audit departments may not be charged with the mission of detecting financial fraud. Their focus may be more on the detection of defalcations or embezzlements or other operational concerns rather than financial fraud. External auditors, on the other hand, are responsible for executing audit procedures that provide reasonable assurance as to whether the financial statements are free of material misstatement. Financial fraud is one situation that causes financial statements to be materially misstated. Requirements within SAS No. 53 clearly indicate that attention to red flags that may signal misstatements due to errors, defalcations, or financial fraud is a key element allowing audit procedures to provide such assurance. Although the standard states that auditors are not guarantors of the financial statements, it is clear that auditor responsibility is increased when red flags are present. For this reason, auditor attention to red flags,

especially as they may be indicators of potential financial fraud, is a significant issue facing the profession.

Also motivating this dissertation is the belief that auditors have been deficient in their role as detectors of red flags. This belief has been expressed, either directly or indirectly, by several different groups. The Board of Directors of the AICPA [1993, p. 1] listed "Improving the prevention and detection of fraud" first among the five key areas in which reforms were being pursued. The Public Oversight Board of the SEC practice section of the AICPA [1993], a board formed to oversee the quality control practices of the firms that audit publicly held companies, recently stated that there is a widespread belief that auditors are not meeting their responsibilities for the detection of financial fraud. They made several recommendations aimed at improving auditor performance in this critical area. The National Commission on Fraudulent Financial Reporting, or Treadway Commission, was charged with the mission of identifying causal factors that can lead to financial fraud and steps to reduce its incidence. Although this commission did indicate that audits play a significant role in detecting financial fraud, its report added that independent accountants can and should do more. Also commenting on the auditor's role in fraud detection was a comprehensive fraud survey conducted by a major accounting firm. In this survey, it was reported that only three percent

of the frauds commented upon by survey respondents were detected by external auditors [Coogan and Carey, 1993, p. 10].⁵ These statements and findings, coupled with the fact that, as of October, 1993, the accounting profession had been named in lawsuits aggregating to \$15 billion (many of which have been filed for alleged failure to detect fraud during audits) [Wells et al., 1993] reinforce the perception that auditors have been deficient in their role of detecting indicators of potential financial fraud.

Given that this issue is an important one to the profession and that there are perceived deficiencies in the current level at which auditors perform their role, it would follow that there is a need for research investigating the possible sources of these deficiencies. Toward that end, the Board of Directors of the AICPA [1993, p. 3] has called for a research program to learn "...what audit procedures did detect or might have detected the illegality and how audits can be changed to prevent reoccurrence." Although the Board called for a case study approach, the research question is similar to that addressed by this dissertation--why do auditors fail in meeting expectations in the area of red flag detection. This dissertation addresses this research question by presenting

⁵ This finding may be qualified somewhat by the fact that only one percent of the frauds commented upon in the survey were identified as "false financial statements" [KPMG Peat Marwick, 1993, p. 6]. Despite this qualification, the finding has important implications for the auditor's cognitive predisposition toward the detection of indicators of potential financial fraud.

and analyzing data gathered in an experiment in which practicing auditors are called upon to execute an auditing task. Before detailing the experimental task, however, the theoretical foundation supporting this type of inquiry is discussed.

CHAPTER 2

THEORETICAL DEVELOPMENT

Overview

Having asserted that a perceived deficiency exists with regard to auditors' performance in the arena of red flag detection, this dissertation now focuses on sources of this perceived deficiency. It may be appropriate to consider auditors' failure to detect red flags as a member of a class of behaviors that the literature labels "dysfunctional" audit behaviors. Time pressure has been identified as a feature of the auditing context that may lead to several dysfunctional behaviors such as underreporting of audit hours, premature signoff, and superficial review of client documents [Kelly and Margheim, 1990]. The following discussion surveys the research into the effects of time pressure on "dysfunctional" auditor behaviors.

The market context in which auditors operate has increased the importance of efficiency as well as effectiveness in auditing performance. As a result auditors are constrained by increasingly stringent time budgets [Loebbecke and Steinbart, 1987]. In addition to the constraints placed on the time allowed to carry out audit procedures, the increase in the number of lawsuits filed against auditors has demanded greater accountability for the results of the procedures applied under time pressure [Lord and DeZoort, 1992]. When these demands for increased

efficiency and increased effectiveness conflict, auditors are likely to experience what Schuler [1980] terms demand stress. Stress has been shown to produce certain cognitive responses in individuals in which affective considerations displace logical or empirical considerations in information processing [Etzioni, 1988]. Among these responses is a reduction in the range of cue utilization in attentional processes.

Put broadly, the institutional context of this study is based upon the notion that both the economics of auditing and the cognitive conditions that inform auditors give rise to a predictable tendency to discount the relevance of secondary tasks (e.g., red flag detection) as time pressure increases. The remainder of this chapter reviews the literature that discusses the economics of auditing and the cognitive conditions that are expected to be operationalized in the auditing context.

Time Pressure and the Economics of Auditing

Both competitive bidding for audit services and heightened attention to audit costs have become significant factors in the market for auditing services, particularly after the AICPA's Code of Professional Conduct was revised in 1972. In response to the increased competition, auditors have placed greater emphasis on time budgets and the discovery and utilization of more efficient procedures [Loebbecke and Steinbart, 1987].

The audit program plays an important role in defining the procedures to be employed in the execution of an audit and in allocating budgeted hours to various audit areas. It typically includes a list of the procedures, the timing of tests, the sample sizes, and an indication of which items to examine in order to carry out the audit within an acceptable level of audit risk. The audit program serves as a means of directing the auditor's attention to the items relevant to the testing of assertions associated with the various transaction cycles and accounts in order to achieve audit objectives.

The possibility exists that audit procedures might not be executed as required by the audit program. This can result in increased nonsampling risk. Nonsampling risk refers to the possibility that audit tests will fail to reveal exceptions existing in an audit sample. To the extent that the failure to carry out tests as designed results in either inappropriate procedures being executed or the auditor's failure to recognize an exception, nonsampling risk is increased. Given that increased nonsampling risk can result in significant audit deficiencies, it would be appropriate to examine the reasons why audit procedures are not executed as planned.

Although its effects are not always negative [e.g., Waggoner and Cashell, 1991], time pressure has been identified as a feature of the auditing environment that might result in deviations from the audit program. Audit firms impose time budgets in an attempt to increase efficiency. At appropriate

levels time pressure can, indeed, increase processing speed and reduce the amount of time spent attending to non-task related cues [Ben Zur and Breznitz, 1981; Payne, Bettman, and Johnson, 1988]. Researchers have attempted to ascertain whether time pressure is being imposed at levels conducive to increasing the efficiency and effectiveness of auditor performance or at levels at which departures from the audit program occur. The following discussion highlights some of those efforts.

Apparently, time pressure in auditing became an object of research when Rhode [1978] surveyed 1,126 practicing auditors and 400 retired auditors on various aspects of the institutionalized context of auditing. Over 48 percent of respondents indicated increasing pressure to reduce hours worked during the three previous years. The same percentage believed time pressure impacts the quality of audits negatively. Twenty three percent admitted to having signed-off on procedures without having performed them. Thirty-one percent believed that excessive time pressure motivates auditors to sign-off prematurely.

Several researchers conducted follow-up studies [Alderman and Deitrick, 1982; Lightner, Adams and Lightner, 1982; and Lightner, Leisenring, and Winters, 1983]. Results essentially confirmed Rhode's findings. For example, Alderman and Deitrick's [1982] study of Big Eight auditors found that 31 percent of seniors and 23 percent of staff believed that

auditors in their firm had prematurely signed-off on procedures.

Lightner, Adams, and Lightner [1982] and Lightner, Leisenring, and Winters [1983] found that underreporting of time worked was a consequence of time pressure. Although the underreporting of audit hours would not seem to reduce audit quality as directly as a premature sign-off might, some consider that it does tend to produce long-run dysfunctions for the quality of auditing [Kelly and Margheim, 1990; Waggoner and Cashell, 1991].

The studies mentioned above examined the effects of time pressure on auditing tests and procedures. Kelly and Margheim [1990] studied the effect of time pressure on a wider range of auditing phenomena. In particular, they were concerned with the effect of time pressure on the thoroughness of the audit procedures that were applied. Twenty-five percent of respondents reported that, as a consequence of time pressure, they had performed somewhat superficial reviews of client documents on their most recent audit.

Further evidence that time pressure is a significant factor in the auditing environment comes from an internal investigation of factors contributing to success in public accounting performed by a major accounting firm. The results of this investigation, a survey of successful senior auditors, indicated that the ability to handle stressful situations was consistently rated as a very important factor for success in

the profession. In fact, in the rating of 122 potential factors for success, four of the six most important factors had to do with the ability to perform under conditions of time pressure (see Appendix A for a listing of the top-rated factors).

It would appear, based on the findings reported in the literature, that time pressure is a salient feature of the auditing environment that produces several dysfunctions. Given that, the focus now turns to the issue of whether the perceived deficiency in auditor attention to red flags is another dysfunctional behavior that may be attributable, in part, to time pressure. This analysis begins by considering the overall audit risk model as it relates to red flag detection and time pressure.

Audit risk has been defined as "the risk that the auditor may unknowingly fail to appropriately modify his opinion on financial statements that are materially misstated." [AICPA, 1992, AU 312.02]. Failure to detect red flags is clearly and positively correlated with the likelihood that financial statements may be materially misstated. In terms of the audit risk model, time pressure can affect the nonsampling component of detection risk. Nonsampling risk exists because applying an audit procedure to all transactions or balances may still result in a failure to detect a material misstatement. Nonsampling risk is increased in situations where the audit procedures selected are not appropriate to

obtain the specific objective or where auditors may fail to recognize material misstatements in the documents that are examined. McDaniel [1990] experimentally examined the effects of time pressure on audit performance and found that increased time pressure was associated with decreased processing accuracy and decreased sampling adequacy. Both of these dysfunctional behaviors effectively increase nonsampling risk and, therefore, increase audit risk.⁶ So, although the statements on auditing standards claim that, "[n]onsampling risk can be reduced to a negligible level through such factors as adequate planning and supervision" [AICPA, 1992, AU 350.11], McDaniel's study indicates that time pressure is a factor that works against such efforts. Studies identifying some of the dysfunctional effects of time pressure in the auditing environment indicate that there is reason to believe that more than a negligible level of nonsampling risk may result.

The arousal produced when auditors perceive the allotted time to be insufficient to execute procedures and judgments as required by the audit program should produce what Schuler [1980] terms demand stress. Demand stress arises when decision makers perceive that they will not be able to complete the task as initially required. The psychology

⁶ As noted by McDaniel [1990], decreased sampling adequacy is indicative of increased sampling risk. Decreased sampling adequacy may also increase nonsampling risk in that the procedure for selecting the sample (an audit procedure) is inappropriate.

literature has addressed the positive and negative effects of arousing conditions such as demand stress. The following section combines this literature with the institutional context of time pressure in auditing in order to provide a theoretical structure for the empirical inquiry described here.

Responses to Stress

Demand stress induces several responses that may not occur under less stressful conditions. Holsti [1978, p. 44] summarizes the findings with regard to the effects of stress on individuals' information processing behavior:

[Stress leads to]...increased random behavior; increased rate of error; regression to simple and more primitive modes of response; problem solving rigidity; diminished focus of attention, across both time and space; reduced ability to discriminate the dangerous from the trivial; diminished scope of complex perceptual activity; loss of abstract ability; disorientation of visual motor coordination... [T]olerance for ambiguity is reduced under high stress. Under these conditions individuals made decisions before adequate information was available, with the result that they performed much less capably than persons working under normal conditions.

Weick [1983, p. 355] noted several similar responses to stress--"People notice fewer details, they look for shorter periods of time, and they assimilate novel perceptions to events they have seen before." In addition, Weick indicated that there is evidence that people revert to dominant, first-learned patterns of response rather than those that were more recently learned.

While the statements made by Holsti [1978] and Weick [1983] identify a number of apparently disparate effects of

stress, there may be an underlying concept that links them. Several studies indicate that stress may impede the ability to deal with complex or new issues. Stress may thus cause individuals to ignore anything that adds to their cognitive burden. This reductive effect may have serious implications for auditors. The nature of the auditor's role is to understand the complexities of the client's business and to interpret detailed information in light of these complex relationships. If too much importance is placed upon the accumulation of details without the necessary interpretation of them in light of complexities, auditors may lose their attitude of professional skepticism and become averse to executing cognitively complex analyses.

The source of this limitation on the ability to execute cognitively complex procedures may reside in individuals' attentional processes. Probably the most notable of all responses to stress are detailed in the "Easterbrook hypothesis" and the "behavioral law." Initially proposed by Easterbrook [1959], the hypothesis that there is a progressive reduction in the range of cue utilization that accompanies increases in arousal (stress) has been confirmed in several more recent studies (see Eysenck [1982] for a review of thirty studies reporting such results). In routine tasks where attention to only a few cues is required, increased arousal should increase performance on the task by reducing the extent to which attention is paid to extraneous cues, thereby

increasing processing speed. When arousal increases to the point that the cues that are filtered out are crucial to the performance of the task, performance decrements should be observed.

By expressing the effects of arousal in terms of their effects on attention, Easterbrook provided theoretical support for the Yerkes-Dodson law [Yerkes and Dodson, 1908]. The Yerkes-Dodson law describes two characteristics of the relationship between arousal and performance. First, it holds that an inverted-U shaped relationship exists between arousal and performance; that is, performance is best at some intermediate, optimizing level of arousal. The second assertion is that this optimal level of arousal varies inversely with the level of task complexity. Thus peak performance on complex tasks is presumed facilitated by low levels of arousal, while peak performance on simple tasks is facilitated by high levels of arousal. Easterbrook's formulation of the effects of arousal on attention provides a potential explanation of the inverse relationship between the optimal level of arousal and task complexity as stated by the Yerkes-Dodson law. The two views can be theoretically linked by associating the onset of decreased performance with the filtering out of cues that are crucial to task performance. Given that complex tasks often require attention to a wider range of cues; and, given that the range of attention is reduced as arousal increases, it follows that cues relevant to

the execution of complex tasks are likely to be outside of the reduced range of attention associated with increased arousal. The relationship between the Yerkes-Dodson law and the Easterbrook hypothesis is depicted graphically in Figure 1. The top graph in Figure 1 depicts both of the major tenets of the Yerkes-Dodson law. The inverted-U shape of each of the curves demonstrates that performance of a given task is optimized at some intermediate level of arousal. The relative position of the two inverted-U shaped curves demonstrates that the level of arousal necessary to achieve optimum performance on a complex task is less than that required for optimum performance on a simpler task. The bottom graph depicts the Easterbrook hypothesis by showing that as arousal increases the number of cues attended to decreases. Under high levels of arousal, relatively few cues may be considered. The integration of the two graphs demonstrates that the number of cues to be considered in order to achieve optimum performance of a complex task is higher than the number required for optimum performance of a simpler task. If the level of arousal experienced by an individual is higher than that which is optimal for the performance of the assigned task, it would be reasonable to expect this individual to attend to a smaller number of cues than would be optimal, perhaps resulting in a lower than optimal level of performance.

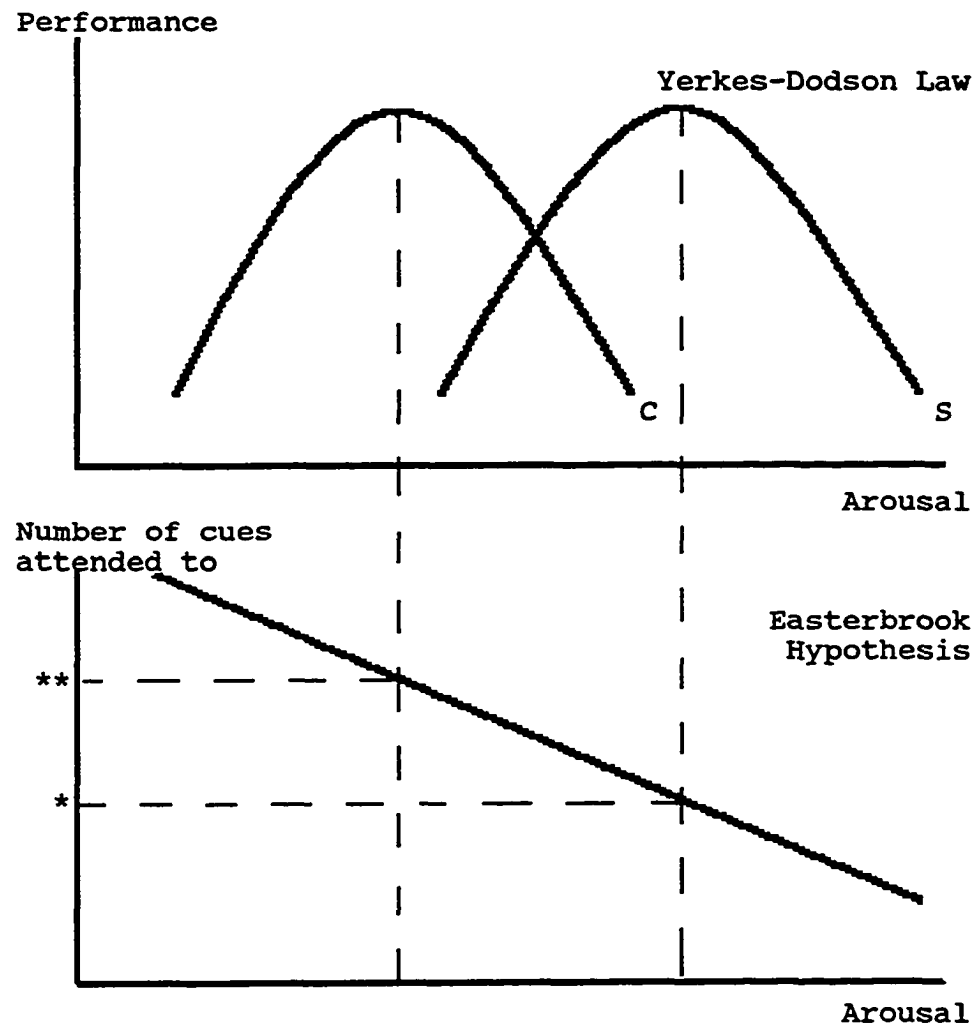
Kahneman [1973, p. 38] summarizes the research investigating the Easterbrook hypothesis as follows:

This research demonstrates that high arousal causes attention to be concentrated on the dominant aspects of the situation at the expense of other aspects. As Easterbrook noted, such a change of allocation policy will disrupt any performance in which attention must be deployed over a wide range of cues.

Auditing tasks do, indeed, require attention to be deployed over a wide range of cues in many situations. In fact, the "ability to see the 'big picture' in addition to the details of a particular task," and the "ability to analyze information and facts and understand relationships between facts" were rated as two of the most important factors for success as an auditor [Eldridge, 1992, see Appendix A]. These are precisely the types of skills that the Easterbrook hypothesis predicts will be impaired under conditions of arousal. Given that time pressure, a potentially arousing agent, is salient in the auditing environment, the Easterbrook hypothesis predicts that performance on tasks judged to be crucial for success as an auditor will sometimes be impaired.

The behavioral law is closely related to the Easterbrook hypothesis. It states that increased arousal increases the probability of the occurrence of the most dominant response [Hull, 1943]. The Easterbrook hypothesis provides a plausible explanation for the behavioral law; because the range of cues utilized is reduced under stress, the dominant response has a higher probability of occurrence.

The preceding discussion established the prediction that a reduction in the range of cues attended to will occur under arousal with an increased probability that the dominant cue



S = Performance curve for a simple task

C = Performance curve for a complex task

* = Number of cues required for the optimum level of performance of a simple task

** = Number of cues required for the optimum level of performance of a complex task

Figure 1

Graphical Relationship between the Yerkes-Dodson Law
and the Easterbrook Hypothesis

will capture attention. The focus now becomes the explanation of why such effects should be noted. In addition to explaining why such effects are likely to occur, the literature will be called upon to outline the properties of the cues that are likely to be dominant. From this analysis, it should be possible to predict which types of cues auditors will attend to under varying conditions of time pressure.

Explanations of the Responses to Stress

Several speculative models of information processing have attempted to provide insight as to why responses to arousal noted by Easterbrook and Hull are likely to occur. Martindale [1981] proposed a hierarchical feature model based on the frameworks developed by Sokolov [1960] and Walley and Weiden [1973, 1974]. Hierarchical feature models are models with multiple levels of cognitive processing units that possess properties of upward excitation and lateral inhibition.⁷ As they are general models of the determinants of cognitive activity under a variety of conditions, they presumably can provide insight into the determinants of auditors' responses to stress.

Martindale's [1981] model conceptualizes primary memory (or consciousness) as the set of currently activated cognitive units and attention as a subset of these units (usually a

⁷ In order to present a more parsimonious account of processing activity, discussion of the levels of processing units will not be undertaken.

subset of one) that is most strongly activated.⁸ Activation of cognitive units may result from arousal potential of the stimuli present in the task with which the individual is involved or the environment in which it takes place. When an arousing stimulus is perceived, activation is spread throughout the system to all of the cognitive units. Because of the property of lateral inhibition and the way that this increased activation is theorized to interact with the cognitive units, those cognitive units that were more activated than the others prior to the perception of the arousing agent will receive most of the additional activation introduced to the system and become even more strongly activated following the response. Martindale [1981, p. 251] restates the Easterbrook hypothesis and the behavioral law in terms of the hierarchical feature model as follows:

Increasing arousal increases the activation of the dominant or strongest unit relative to the activation of other units. ...[T]he most activated unit is the one that captures attention.

Because attention was defined to be the subset of cognitive units most activated at a given point in time and cognitive units may be analogous to cues, increasing arousal increases the probability that the dominant cue will be attended. In tasks where improved performance depends on both reducing the number of cues attended to and processing a few key cues more

⁸ The term activation is used here to be consistent with Martindale's [1981] model. The term excitation, as it has been used in other models, is virtually synonymous with activation in this context.

efficiently, increased arousal may be beneficial. In tasks where improved performance depends on attending to a wider range of cues and integrating them into an overall conceptualization of the task, increased arousal may hinder performance.

The hierarchical feature model described above may provide theoretical support for the Easterbrook hypothesis and the behavioral law. Several studies of attention provide empirical support to augment the theoretical support. The performance decrements associated with increased arousal are often most pronounced and visible in situations where two tasks are being performed at the same time. For this reason, a dual-task paradigm has typically been employed to study the effects of arousal on attention.

The dual-task methodology for addressing the issue of cue utilization typically involves concurrent performance of what are labelled "primary" and "subsidiary" tasks. Broadbent [1971] and Kahneman [1973] theorized that individuals do not utilize all of their attentional capacity in most routine tasks. When arousal is increased for subjects performing dual-tasks, they may respond by diverting excess attentional resources to the primary task. These resources might be diverted from non-task related activities or from the subsidiary task.⁹ In designing the tasks such that

⁹ In situations where the primary task requires all attentional resources prior to the introduction of arousal, the diversion of resources may come from the primary task

performance on the task is indicative of attention¹⁰, insight is gained into the claim made by the Easterbrook hypothesis that the range of attention will narrow under arousing conditions. Several types of results, discussed below, could be supportive of the Easterbrook hypothesis in this paradigm.

When arousal is introduced and individuals can allocate attentional resources previously used for non-task related activities to the "primary" task, performance on the primary task may increase with no significant effect being observed on the subsidiary task [Davies and Jones, 1975; Dornbush, 1965; Hockey, 1970a; Hockey, 1970c]. Although these results cannot be conclusively linked to the Easterbrook hypothesis of attentional narrowing, it does provide a plausible explanation. The results might indicate that the two tasks initially required fewer attentional resources than were available, resulting in resources being expended upon activities not related to either task. The increased arousal may have caused attentional resources to be diverted from the non-task related activities to activities associated with the primary task. This diversion in resources would cause an

itself. These types of tasks could be studied outside of the dual-task paradigm because the effects on any subsidiary tasks should be negligible (due to the possibility that very few resources would have been allocated to the subsidiary task in the initial condition).

¹⁰ Attention has also been referred to as effort or concentration. The link between the construct of attention and performance has been made in Kahneman [1973] and Eysenck [1982].

increased level of performance on the main task without affecting performance on the subsidiary task. It is from this response that the upward-sloping portion of the inverted-U shaped curve linking arousal and performance may be observed.

When increased arousal causes attentional resources to be diverted from the subsidiary task rather than non-task related activities, performance on this task can be expected to fall. The performance decrement on the subsidiary task under arousal appears to be indicative of attentional narrowing. When performance on the primary task increases in conjunction with such an effect, a reallocation of attention is suggested [Eysenck, 1982]. Results supportive of this effect [Kausler, Trapp, and Brewer, 1959; Bahrick, 1954; Bahrick, Fitts, and Rankin, 1952; Rubin, Shantz, and Smock, 1962; Hockey, 1970b; Hockey and Hamilton, 1970] would most likely, again, be associated with the upward-sloping portion of the Yerkes-Dodson curve.¹¹

¹¹ Although, only a small increase in performance of the primary task coupled with a large decrement on the subsidiary task would probably indicate that performance is on the downward-sloping portion of the curve. The actual location on the performance curve depends on the trade-off between performance on the subsidiary and primary tasks. If the subsidiary task is very incidental to overall performance, even large performance decrements would have relatively little impact on overall performance. If the subsidiary task is important, however, it would impact performance more adversely. It is not the purpose of this dissertation to examine the nature of this trade-off for tasks outside of the particular audit task which will be detailed in a subsequent section.

When a decrease in performance on a subsidiary task is accompanied by unchanged performance on a primary task, it is clear that the overall performance level would decline. This result would be indicative of a level of arousal that induces the type of performance decrements associated with the downward sloping portion of the Yerkes-Dodson curve. Many studies provide results supportive of this effect [Bacon, 1974; Kohn, 1954; McNamara and Fisch, 1964; Tecce and Tarnell, 1965; Thornton and Powell, 1974; Wachtel, 1968; Miller and Dost, 1964; Silverman and Blitz, 1956; Weltman and Egstrom, 1966; Weltman, Smith, and Egstrom, 1971; Johnson and Thomson, 1962; Wolk and DuCette, 1974; Bell, 1978; Boggs and Simon, 1968; Cohen and Lezak, 1977; Davies and Jones, 1975; Finkelman and Glass, 1970; O'Malley and Poplawsky, 1971]. These results provide strong evidence supportive of the Easterbrook hypothesis. They indicate that, under arousal, attention may become more focused on the cues most relevant to the primary task at the expense of attention given to cues associated with the secondary task.

Studies examining the level of time pressure present in the auditing environment appear to indicate that the problem facing the auditor is one where tasks are left incomplete in response to arousing conditions, implying that the last group of studies referenced above, where performance on neither task increases, would have the most relevance for this study. None of the studies of the auditing environment have examined which

type of tasks are likely to be affected most adversely. The dual-task paradigm used to study attention could lend insight into this issue in the context of auditing.

Selection of the Dominant Cue

In addition to predicting that there will be a reduction in the range of cue utilization under stress and explaining why this reduction is expected to occur, the literature also provides the basis to predict which types of cues will draw attention. The likelihood that a given stimulus will attract an individual's attention is related to the extent that the stimulus possesses arousal potential. Berlyne [1971] and Martindale [1981] discuss the links between attention and sources and levels of arousal potential.

The relationship between arousal potential and attention is hypothetically expected to take the form of an inverted-U. Attention will be drawn toward stimuli as arousal potential increases until it reaches the point where increasing attention will initiate an aversive response. Berlyne [1971] theorizes that a pleasure system is activated by stimuli possessing a low level of arousal potential. As the arousal potential increases, the pleasure system will become more activated and will be more likely to draw attention to the stimulus. Berlyne contends that a displeasure (or aversion) system becomes activated when a stimulus possesses higher levels of arousal potential thus causing attention to be averted from the stimulus. This effect is important because

it introduces the concept of the level of attention paid to a stimulus, a concept related to that of levels of processing proposed by Craik and Lockhart [1972]. The level at which a stimulus is attended to may be analogous to the level at which the stimulus is processed. Within Craik and Lockhart's theory, deeper processing involves a greater understanding or interpretation of a stimulus. So, while attention will be drawn to many stimuli, the level of attention given to them may or may not allow the processing of meaning. The effect of the reduction of the range of attention in response to arousal described by Easterbrook may be more accurately described in some cases as a reduction of the range of cues processed deeply. This phenomenon is analogous to the finding of increased attentional lability under arousal documented by Eysenck [1982]. The level of attention and depth at which cues are processed depends upon the properties of the arousal potential associated with a given stimulus.

Arousal potential can result from three properties of stimuli--psychophysical, ecological, and collative. Psychophysical properties can be described as the physical intensity of the stimulus (e.g. loudness, brightness, etc.). Ecological properties can be characterized as signal value, meaning, or significance. Novelty, complexity, incongruity, surprise, ambiguity, and conflict are all examples of collative properties of stimuli.

The arousal potential resulting from ecological properties of a stimulus permits the deepest level of processing. Psychophysical and collative properties may draw attention to a given stimulus, but if the meaning of the stimulus is not apparent, it will only be processed at a surface level. The cues can only be understood when the ecological properties of the stimulus are attended to and processed. Within the dual-task paradigm in a situation where the primary and subsidiary tasks require a relatively deep level of processing, attending to the collative properties of a stimulus may not be sufficient to obtain an understanding of the cues. The meaning (or ecological properties) of the relationship possessing these collative properties may need to be explored. When the stimulus possessing these collative properties is associated with the subsidiary task and the amount of attention required to derive the meaning behind the relationship would detract from performance of the primary task, it may be that the arousal associated with the prospect of pursuing the relationship would reach the point where attention would be withdrawn from the stimulus. Recalling that stress increases the level of arousal present in the system and that this arousal exaggerates any of the differences in arousal potential of stimuli that might occur in non-stressful situations, it would follow that the effects described above would be more salient under stressful conditions.

Berlyne [1963, 1971] explains such a phenomenon by asserting that the optimal level of arousal potential is not a maximal or a minimal level. When the level of arousal is too high, discomfort in the form of stress, a negative affective state, results. Individuals will attempt to alter their stimulus field so as to remove themselves from negative affective states to a state where an optimal level of arousal potential is experienced [Fiske and Maddi, 1961; Hunt, 1963; Berlyne, 1960, 1963]. Pieters and Van Raaij [1988, p. 128] explain how individuals achieve such a state: "A decrease of arousal potential is reached by 'solving' the inconsistencies in the present stimulus field or by attending to less stimuli."

Pieters and Van Raaij's statement emphasizes the two ways in which the narrowing of attention under stress may occur. It may be the result of the tendency for increased activation associated with stress to exacerbate any differences between the arousal potential of cues. This tendency would cause cues whose arousal potential may have been sufficient to draw attention prior to arousal to remain unattended to in the stressful environment. In this case arousal would appear to activate a sort of pre-attention filtering mechanism. On the other hand, it may be the result of the negative affect associated with continued attention to (and processing of) cues that do not contribute directly to performance of the

primary task. In a sense, what is described is a sort of attentional coping mechanism.

These comments indicate a tendency toward a strategy of simplification under conditions of arousal. Such a strategy would seem to conflict with the requirements of professional auditing standards.

The Dual-Task Paradigm in the Auditing Environment

McDaniel's [1990] study provided significant insight into the effects of time pressure in the auditing environment. McDaniel focused on the extent to which performance of a single task was affected by time pressure.¹² The models presented above indicate that the earliest and most significant effects of time pressure may not be detected with an analysis that examines performance on only one task. They indicate that these effects are likely to have a significant impact on a subsidiary task when two tasks are being performed concurrently.

The question then arises as to whether or not auditors are faced with situations where they are required to perform two tasks concurrently. As discussed in the introduction, it seems quite clear that auditors do, indeed, perform concurrent

¹² This discussion is not meant to detract from the significance of McDaniel's study in any way. In fact, McDaniel's study provides the important foundation upon which this study attempts to build through incorporation of an altered version of the test instrument, operationalizing the construct of time pressure in the same way, and measuring audit output performance similarly. Despite these similarities, this study cannot and does not attempt to replicate McDaniel's results.

tasks. It is also evident that the same audit procedures serve multiple purposes with respect to auditor judgment and decision. The authoritative standard regarding errors and irregularities cited in the introduction makes that point explicitly. The following excerpt from the professional standard that gives guidance on the auditor's responsibility to detect possible violations of the going concern assumption substantiates that claim:

It is not necessary to design audit procedures solely to identify conditions and events that, when considered in aggregate, indicate that there could be substantial doubt about the entity's ability to continue as a going concern for a reasonable period of time. The results of auditing procedures designed and performed to achieve other audit objectives should be sufficient for that purpose. [AICPA 1992, AU 341.05]

The following assertions, then, can be drawn from the relevant accounting and psychology literature: (1) time pressure is a salient feature of the auditing environment; (2) increased arousal, which may be induced by time pressure, can cause attention to become more focused on primary-task-related cues at the expense of attention given to secondary cues; and, (3) the auditing context is a dual cognitive task environment in which the complex task of attending to red flags may be considered secondary to other tasks. The research hypothesis that in the auditing environment time pressure may cause auditors' attention to become focused on cues related to test of details tasks at the expense of attention to red flags emerges from these assertions.

Intuitive support for this research hypothesis may be derived from the recommendations of the National Commission on Fraudulent Financial Reporting, the so-called Treadway Commission. The Treadway Commission made several observations and recommendations to independent public accountants. Among them was the following observation with regard to the assignment of responsibility for the consequences of fraudulent reporting:

In many cases, although indications of possible improprieties, or "red flags," existed, independent public accountants failed to recognize or pursue them with skepticism. The SEC believed that, if the independent public accountants had investigated these red flags, the fraudulent activity would have had a greater likelihood of being uncovered. [National Commission on Fraudulent Financial Reporting, 1987, p.25]

In assessing why such oversights were so common, the commission went on to note the following situation:

Intense competition among accounting firms contributes to significant pressure on audit fees, often with corresponding pressure to reduce staff, time budgets, and partner involvement in audit engagements. Such pressures may not be conducive to the thorough investigation of red flags indicating the potential for fraudulent financial reporting or to the thorough exercise of professional judgment and skepticism. [National Commission on Fraudulent Financial Reporting, 1987, p. 56]

As a result, they went on to make the recommendation that, "Public accounting firms should recognize and control the organizational and individual pressures that potentially reduce audit quality." [National Commission on Fraudulent Financial Reporting, 1987, p. 56] Clearly, the research hypothesis stated above is consistent with the findings and recommendations of the Treadway Commission.

In the current Congressional session, Representative Wyden has proposed House Resolution 574, the so-called Financial Fraud Detection and Disclosure Act. Although the bill basically reaffirms the responsibilities for financial fraud detection and reporting communicated in auditing standards, this action serves as an indication of the government's increased interest in the way in which auditors address the issue of financial fraud and red flag detection. The proposed study may serve to clarify the factors influencing auditors' ability to attend to red flags.

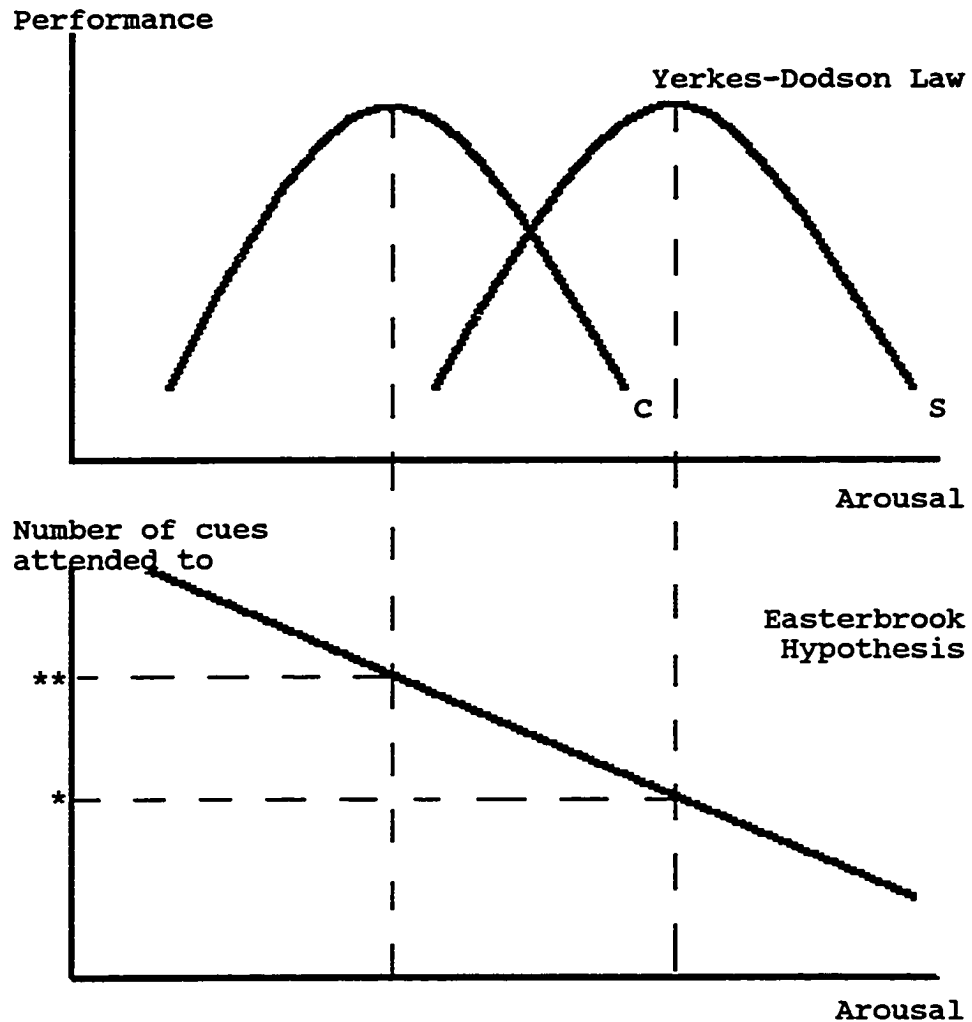
These events, observations, and recommendations add to the compelling reasons for undertaking this study. They indicate that the significant pressures placed upon auditors may cause them to subordinate red flag detection, a task not directly associated with specific audit procedures, to tasks for which the time budget holds them directly accountable, such as substantive tests of details of balances. As such, these tasks would be considered primary tasks in the dual-task paradigm while red flag detection would be considered a subsidiary task. Support for this conceptualization of the auditing environment may be found in recent statements made by the Public Oversight Board of the SEC Practice Section, AICPA [1993]:

Before the turn of the century both auditors and the users of audited financial information regarded the detection of fraud as one of the primary purposes of an audit. For many reasons the profession has moved from an acceptance of that purpose to the view that its role in detecting fraud is secondary to the other purposes of

audits. In contrast, the public has continued to regard fraud detection as an important goal of the audit process--and now attaches even greater importance to that goal [Public Oversight Board of the SEC Practice Section, AICPA, 1993, p. 42].

The time budget is a very tangible means of assessing performance. As such, the ability to meet the time budget is a criterion for evaluation on most audits. Feedback on this aspect of the auditor's performance is timely and clear. Measures of an auditor's attitude of professional skepticism and attention to complex issues is far less tangible. Should an audit fail to reveal an irregularity that was present at the time of the audit, it may not be detected promptly, if at all. Feedback on this matter is not as timely. Because auditors are immediately accountable for performing audit procedures within the guidelines of the time budget and less immediately accountable for their attention to broader issues, they may have a tendency to treat procedures as the primary task and other issues as subsidiary tasks.

Figure 2 graphically depicts the relationship between the Easterbrook hypothesis and the Yerkes-Dodson Law within the auditing context. The task of executing auditing tests of details while being attentive to red flags is a relatively complex task. The task of merely executing auditing tests of details without being attentive to red flags is a relatively simple task. When time budgets are set restrictively, auditors may experience increased levels of arousal. Indeed, the perception that the time allotted may be insufficient to



S = Performance curve for executing the tests of details task

C = Performance curve for the dual-tasks of concurrently attending to red flags and executing tests of details

* = Number of cues required for the optimum level of performance of the tests of details task

** = Number of cues required for the optimum level of performance of the concurrent attention task

Figure 2

Graphical Relationship between the Yerkes-Dodson Law and the Easterbrook Hypothesis in the Auditing Context

complete the procedures as assigned may induce more arousal. At this heightened level of arousal, auditors may find themselves unable to attend to the full range of cues required to concurrently execute the tests of details and attend to red flags.

Summary

This section has examined the literature and the theory relating to the effects of increasing levels of time pressure on the performance of audit procedures that require attention to red flags while executing tests of details. The following sections describe the design and results of an experiment in which time pressure was manipulated at levels that placed auditors beyond the peak of the inverted-U shaped curve relating arousal and performance. This experiment tests the prediction that increases in time pressure would have a more detrimental effect on the task of red flag detection than they would on the primary task of executing substantive tests. Such an effect could be attributed to the reduction of the range of attention under arousal as predicted by the Easterbrook hypothesis.

CHAPTER 3
METHODS OF INQUIRY
Research Approach

The previous sections outlined the problem to be addressed in this dissertation, the reasons why such a problem should be addressed, and the results that would be expected to be obtained from such an investigation. This section will outline the method to be used to analyze the problem in accordance with the specifications of the previous sections. Included will be a discussion of why a controlled experiment was considered more appropriate for addressing this problem than the more common survey or field study approaches.

McDaniel [1988] documents the shortcomings of surveys and field studies in an analysis of the effects of time pressure on audit performance. The primary weakness of the survey method in this type of analysis is that there may not be a direct link between actual allocation of attentional resources and self-reported behaviors. The reallocation of attention under time pressure may be a passive and automatic process, or it may be an active coping response [Eysenck, 1982]. In either case, it is unlikely that self-reports would capture the narrowing of the range of attention under time pressure. If this reallocation of attention were passive, it is not likely that it would be reported by survey respondents simply because it would be unknown to them. When it is an active coping response, respondents may not be aware of its effects

on performance. Presumably, if subjects were aware that their responses to time pressure were having the types of effects on audit quality that were detailed in the Treadway Commission's report they would not engage in them. As a result of these limitations, the survey approach is not likely to be an effective means of capturing the effects of time pressure on attention and performance.

A field study approach may also be inappropriate because it would be difficult to draw conclusions about the range of cues to which auditors attend without direct output measures of audit performance. Output measures of audit performance are not available on most audits as it is only in cases where audits are investigated that any indication of audit ineffectiveness may be detected [AICPA, 1978; McDaniel, 1988]. That is, an auditor's failure to identify a financial statement error may be realized only in instances where events subsequent to the conclusion of the audit lead to such actions as litigation alleging auditor negligence or peer review of audit procedures. In these instances it would be impossible to manipulate and difficult to measure the construct of time pressure. So, although the field study approach might maximize mundane realism or ecological validity, it would be impractical to gather enough data to conduct a meaningful analysis of the theoretical predictions discussed.

The preceding discussion indicates that an experimental approach may be most appropriate. The strength of the

experimental method is the level of internal validity that can be achieved with proper design. Because it is the presence of the psychological effect of a reduction in the range of attention under time pressure that is of interest, care must be exercised to ensure that the independent variable is being manipulated appropriately and that there are reliable measures of the variables of interest.

Subjects

Sixty-three auditors representing the offices of several different accounting firms in two different cities participated in the experiment. The size of the offices represented ranged from large Big Six offices to smaller offices of regional accounting firms that provide audit services. While conducting an experiment on such a diverse group presents certain threats to the internal validity of the experiment, the generalizability of the results to the entire population of auditors may be enhanced. The results most likely are not as sensitive to one particular firm's practices and training with respect to red flag detection. The threats to internal validity are related to the possibility that the experiment was administered several times at different locations. These threats were minimized through random assignment of participants to the time pressure treatment groups.

Experimental Task

The primary concern in designing an experimental task to achieve a high level of internal validity is that the subjects attend to independent variables. In this dissertation, such an effect would be achieved in large part if the subjects were to experience greater levels of time pressure as the time allotted to complete the task decreases, thus indicating that the construct of time pressure was being manipulated effectively.

Consideration of internal validity issues did not completely dominate the process of experimental task design. Because this study explicitly examines the context in which auditing occurs, particular attention was given to the mundane realism of the experimental task. As such, the experimental task was similar to those performed under time pressure by practitioners. Such an experimental task was developed by discussing audit procedures with practitioners, matching the task to the appropriate experience level of the subjects, and manipulating time pressure at levels normally experienced by practicing auditors.

McDaniel [1988, 1990] developed and employed such a task in an experimental analysis of time pressure on audit efficiency and effectiveness. In order to achieve a high level of task realism, attention was given to the design considerations noted above. The key to the appropriateness of the task, however, was its valid manipulation of time

pressure. The data obtained from McDaniel's post-experimental questionnaire indicated that the subjects did, indeed, experience greater levels of time pressure as the amount of time allotted for the completion of the task decreased.

With some alteration of the data and instructions, the main features of McDaniel's task were used to address the research questions raised in the previous sections of this proposal. Because McDaniel's instrument was designed in accordance with the specifications outlined earlier, has been tested, and has been subjected to the scrutiny of peers, its use has most likely provided a more powerful analysis than the use of a completely original task would. McDaniel's study measured the effect of time pressure on the performance of a single task, however. In order to create a relevant second task and to make the auditors aware of their responsibilities for executing both tasks, McDaniel's experimental instrument was altered. Consistent with McDaniel's approach to task design and influenced by conversations with McDaniel, the alterations were incorporated based upon discussions with practitioners and the results of an extensive pretesting process.

An extensive pretesting process was undertaken in order to adapt McDaniel's instrument for the purposes of studying auditors' attention to red flags in a dual-task environment. An incremental approach to revisions was taken to avoid making unnecessary departures from McDaniel's task. As a result the

instrument was pretested by auditors seven different times and twice by graduate students before it was considered appropriate for the research task. The pretesting process is described in Appendix B.

McDaniel's task was a test of details of inventory for a medium-sized manufacturing client. The participating auditors were given background information on the client and instructed to gather evidence to test the valuation and completeness assertions for finished goods inventory and inventory reserve. The tests to be performed were outlined in a partial year-end audit program.¹³ The data upon which these audit procedures were executed consisted of inventory and inventory reserve record prices and amounts for 25 products sold to each of the 60 customers of a hypothetical audit client. The audit program detailed the sample size and the source of the data for each of the four tests of details. The auditors were instructed to indicate whether each item selected for investigation from the client's records was correctly reported in the records or reported erroneously based on criteria that were provided in the background materials. McDaniel chose this type of task because it is representative of what is typically performed under time pressure and because

¹³ McDaniel examined the individual and interactive effects of both time pressure and audit program structure on effectiveness and efficiency. This study examines the effects of time pressure using only the structured portion of McDaniel's task. As such, the task instructions would not need to be so general as to communicate objectives to auditors in both the structured and unstructured conditions.

performance could be objectively measured. It is also well suited for this dissertation in that it involves the audit of inventory--the audit area most often associated with fraudulent financial reporting, as indicated by a recent survey of auditors who have encountered material irregularities in audits [Loebbecke, Eining, and Willingham, 1989].

In administering the experiment, McDaniel imposed four different levels of time pressure on different groups of auditors. The measurements made by McDaniel were of the number of items examined for each of the tests and the accuracy with which they were examined. These measurements provided information on the efficiency and effectiveness of processing that were validated by the review process. McDaniel's task thus provides an important mechanism for establishing an output measure of performance on a validated audit test of details type of task.

As discussed in other sections of this dissertation, auditors are required to execute such tests of details as those prescribed in McDaniel's experimental task while being attentive to red flags. McDaniel's task did not address the dual nature of the auditor's role. The auditors executing McDaniel's single audit task were not required to perform any significant interpretation of the data processed.

The following three types of changes were made to McDaniel's instrument in order to adapt it to a dual-task

structure: 1) changes that made it clear to the participants that they were responsible for being attentive to red flags in addition to executing detailed audit tests; 2) changes that indicate that red flags may be present; and, 3) changes that increased auditors' understanding of the mechanics and implications of client policies and procedures. A sample of the proposed experimental materials reflecting the results of all of the changes to McDaniel's test instrument is presented in Appendix C. The following discussion explains each of the three types of changes that were made.

Auditors' Responsibilities

Just as with McDaniel's task, the experiment involved the execution of tests of details of inventory records in accordance with instructions outlined in an audit program to achieve the audit objectives of evaluating completeness and valuation assertions. Unlike McDaniel's task, however, the participants were instructed that they were to be attentive to any indicators of possible irregularities present in the data and follow up on them just as they would in an actual audit situation. Statements emphasizing this point were disclosed in the task instructions, the statement of audit objectives, the audit program instructions, and the audit program. Some of these statements emphasized that attention to unusual items and possible irregularities is necessary to meet audit objectives. Others emphasized that this attentiveness needs to take place during the execution of all audit procedures.

A third subset of these statements emphasized the importance of following up on unusual items noted and documenting them. Several practicing accountants at various levels of experience reviewed the wording of these statements and did not consider them to be inconsistent with audit responsibilities as they are communicated in practice.¹⁴

Seeding Red Flags

In addition to the changes made to emphasize that the participating auditors are responsible for executing a dual role in this task just as they are in an actual audit situation, changes needed to be made to the task materials in order to seed red flags. These changes can be classified either 1) as statements indicating that the context in which the client is operating provides the incentive and opportunity for irregularities to occur or 2) as changes made to inventory and reserve data that, especially when analyzed in conjunction with the contextual factors present, indicate that there is a strong possibility that irregularities exist. The following discussion describes these contextual and data changes.

Contextual Changes

The contextual changes to McDaniel's task were made to increase the level of professional skepticism with which the

¹⁴ These practicing auditors were not assessing whether or not the extent to which the task materials communicated the auditor's responsibility to detect irregularities was consistent with audit practice. The focus was on whether or not the terminology and wording and meaning was inconsistent with practice.

auditors were to conduct the audit program tests. Because McDaniel studied a test of details type of task in which the auditors knew that they were not responsible for providing any significant interpretation of the results of the audit procedures applied, the main emphasis was on explaining the limited objectives to be achieved. In the revised task, however, the auditors were informed of the broader objectives of detecting, following up upon, and documenting any unusual circumstances noted with regard to the client. In order to induce the auditors to adopt an attitude of increased professional skepticism that would facilitate the attainment of these broader objectives, the contextual environment needed to communicate that such an attitude would be appropriate. Loebbecke, Eining, and Willingham [1989] and SAS No. 53 [AICPA, 1988] detail several conditions and motivating factors that increase the likelihood of material irregularities. Several of these factors were incorporated in a reasonable scenario for the client described in the task materials. They were communicated to the auditors through an excerpt from the audit planning memo regarding the client's operating environment.

Included in this excerpt were two types of statements. One type was designed to direct attention to the cues present in the data suggesting that the client may be engaged in irregularities. Examples of this type of statement include those that refer to and explain the implications of a lower

aggregate inventory turnover ratio. The other type of statement was designed to indicate that the conditions (or opportunities) and motivating factors (or incentives) necessary for irregularities to surface are present. Statements indicating increased risk, increased competition, difficulty in retaining customers, a slowing-down of the movement of inventory, the presence of a financial statement based incentive plan, and the centralization of authority (communicated in the auditor's notes on the client's policy for valuing the reserve) should serve to increase the level of professional skepticism displayed by the auditors. All of these factors are consistent with the type of potential irregularities that were seeded in the task data, to be discussed next.

Task Data Changes

McDaniel's task data was altered in two significant ways to be appropriate for the study of the effects of time pressure on auditors' attention to red flags. First, the distribution of the client's customer sizes was changed somewhat. McDaniel's task involved customers of approximately equal sizes. This distribution was achieved by randomly selecting an integer between one and 1,000 for each average monthly usage value for each of the 25 products sold to each customer. The number of units on hand was generated by multiplying the average monthly use by a random number between zero and three (for items that were randomly selected to be

overstocked, average monthly use was multiplied by a number between three and six). In the revised task, the customer sizes were altered to be more consistent with distributions that auditors may encounter in actual audit situations [as discussed in the Audit Sampling Guide, AICPA, 1992, AAG-SAM 4.16]. The task contains five very large customers, 20 moderately large customers, and 35 small customers. The reason for making this change is not just to add realism to the task, as a lack of realism did not appear to be a problem with McDaniel's task. Rather, the change in distribution was made to make the indicators irregularities seeded within the data more salient.

The potential irregularities follow from the consistent omission of overstocked items from the Reserve for Slow-Moving and Obsolete Inventory record for two very large customers. These are the only apparent material irregularities in the data. All of the other misstatements are more indicative of errors (i.e., they are mostly transposition errors and appear to be random in either direction). All of these types of errors will be seeded in accordance with the expected population error rates (based on previous audit experience with the client) reported in the task materials. Although the seeding rate of omissions from the reserve record is different from that reported in the materials and by McDaniel, the policy for valuing the Reserve for Slow-Moving and Overstocked Inventory is the same. This policy explains that the client

being audited must record an entry for each item whose units on hand exceeds three times the average monthly usage (quantities that are both reported in the finished goods record). The amount of this entry is given by the excess units (i.e. the number of items in excess of three months usage) taken at the item's current unit cost. The total in the Reserve for Slow-Moving and Obsolete Inventory Record is subtracted from the total in the Finished Goods Inventory Record to arrive at a final inventory valuation.

The average customer (excluding the two customers with consistent omissions) has around four out of 25 products whose quantity on hand exceeds three times the average monthly usage. Across all of these customers, all but three percent of these items are properly reported on the reserve record. For the two very large customers with consistent omissions from the reserve record (hereafter referred to as the "red flag" customers), the quantity on hand exceeds three times the average monthly usage for all of the 25 products. These two customers have an average number of items (around four) reported on the reserve record, however. Given the client's policy, these reserve item omissions have the effect of overstating inventory and net income. The number and pattern of these omissions, coupled with the other contextual information discussed earlier, indicate that there is an increased likelihood that the client is perhaps seeking to cover-up the loss of two very large customers.

The systematic nature of the omissions, coupled with the fact that a normal number of products are listed in the reserve for these two "red flag" customers, decreases the likelihood that the omissions are due to unintentional oversight. Given the information in the task materials regarding the policy for valuing the reserve (e.g., that the policy is well established in the industry and that deviations from the policy would impair the comparability of the client's financial statements with those of its peers), it is unlikely that any intentional omission of items would be justifiable. Even if the auditor did believe that they could be justified, the matter would warrant documentation as an additional item for supervisory attention. Auditing standards in two major areas provide support for the contention that, even though the implications of such a situation are not completely clear, the situation should be attended to and documented by auditors. The following discussion outlines the authoritative guidance on this matter.

The first source of guidance pertains to the consideration of errors and irregularities. The systematic nature of underreporting of excess inventory build-up of all products sold to a few, key customers could be indicative of either a management misinterpretation of the Inventory Reserve policy, or an attempt to conceal the loss of key customers. The former situation would constitute an error, the latter an irregularity. The data presented in the instrument would not

be sufficient to draw a clear conclusion as to whether the misstatement is intentional or not. As such, it would be inappropriate to dismiss the situation without appropriately documenting it for further review.¹⁵ Auditing standards are quite clear in asserting the importance of fully investigating causes and effects of misstatements such as those proposed to be seeded in the data:

The auditor should evaluate the significance of differences between the accounting records and the underlying facts and circumstances detected by the application of auditing procedures. The auditor should consider both the quantitative and qualitative aspects of these matters and whether they are indicative of an error or irregularity. Often a particular matter considered in isolation cannot be identified as an error or irregularity; nevertheless, this evaluation is important. Because irregularities are intentional, they have implications beyond their direct monetary effect and the auditor needs to consider the implications for other aspects of the audit. [AICPA, 1992, AU 316.22]

The second source of guidance pertains to the consideration of the entity's ability to continue as a going concern. Although the source of the misstatements of the inventory reserve listing will be unknown to the participants in the study, one conclusion that cannot be ruled out is that the misstatements are an attempt to conceal the loss of key customers. Because the loss of a key customer is a situation that--especially when combined with other negative conditions and events--may signal the need to consider the entity's

¹⁵ The auditors will be expected to document any errors that are noted. As a result, failure to document any situation which appears unusual could be considered to be representative of audit ineffectiveness.

ability to continue as a going concern [AICPA, 1992, AU 341.06], the situation should be noted and considered for further investigation. The participants in the proposed experiment will be executing their procedures without any information on other audit areas. While they will not be able to consider the interactive effects of conditions and events noted in other portions of the audit, they will be encouraged to report any conditions noted in this area so such considerations could be made.

These two areas of authoritative guidance indicate that misstatements of the type seeded in the experimental data should be documented if the subjects devote enough attention to them to understand their implications. Because the instructions clearly state that any unusual items should be documented in the space provided, the documentation provided by the auditors should serve as a measure of the attention given to these cues. Neglecting to devote attention to these items and document them would be indicative of audit ineffectiveness. The presence and extent of documentation of these misstatements would then constitute output measures of performance that would be indicative of the extent to which attention is paid to subsidiary task-related stimuli. McDaniel's audit effectiveness score applied to the results of the tests of details should measure the attention devoted to the primary task. These measures of performance and attention will be discussed in greater detail in a subsequent section.

Client Policy and Procedure Clarification

Because of the broader audit objectives facing the participants in this study as opposed to McDaniel's study, changes that promoted a greater understanding of the mechanics and implications of the client's policies and procedures were necessary. The broader audit objectives were put in place to encourage auditors to give more attention to unusual items and relationships. The process of pretesting the test instrument revealed that auditors were attending to and investigating unusual relationships, but that some of the items that the auditors were investigating were unrelated to the irregularities seeded in the data. Often these investigations were based on suppositions made about information that was confusing to the auditors. Clarifying information was added to the materials to keep subsequent auditors from pursuing these "dead end" or misleading investigations. Specific examples of these changes are detailed in the discussion below.

First, the number of items for which there were zero units reported in the Finished Goods Inventory Record when in fact there were units on hand caused several pretest auditors to make fruitless investigations. This type of error has little basis in reality. It was appropriate in McDaniel's task because the auditors were not required to understand the implications of the errors that were encountered. In the proposed task, however, the auditors were attempting to

explain those items for which no reasonable explanation existed. For this reason, the seeding rate for these items was reduced from 8% to 1%, also resulting in a reduction in the number of items required to be sampled in the inventory test count (from 60 to 25 per Audit Sampling Guide, AICPA, 1992, AAG-SAM APP A]). Because this reduced the amount of audit procedures required to be executed, the amount of time allotted for the completion of the task was adjusted accordingly.¹⁶

Also misleading to the auditors was the client's policy for valuing the Inventory Reserve (as it was titled in McDaniel's task). Because several auditors did not realize that a failure to disclose an item on this reserve record resulted in an overstatement of inventory and net income, the name of the record was changed and a section entitled "Auditor's Notes on Client Policy" was added. The name of the record was changed to the "Reserve for Slow-Moving and Obsolete Inventory" to more accurately reflect the nature of the items to be included. A sample journal entry that clearly

¹⁶ This adjustment was made by dividing the number of processing items eliminated with this adjustment (35) by the average number of items processed per minute (2.75) for the subjects in McDaniel's study [1988, p. 58]. The result (12.7 minutes) represented an estimate of the amount of time eliminated from the task by reducing the required sample size of the finished goods omission step. The additional time required for increased responsibilities and the time required to induce a lower level of time pressure were also factored into the decision on the total time allotment. These factors were estimated to require approximately the same amount of time as was eliminated by reducing the sample size.

showed how the omission of items from the record would affect assets and net income was also given. Because several pretest auditors believed that excessive omissions from this record may be indicative of an inappropriate policy rather than a reporting problem, a statement was added that established the policy as an accepted industry standard. These changes made the implications of omissions from the reserve record less ambiguous. Auditors who attended to this information should have realized that such omissions are indicative of a departure from generally accepted accounting principles. Appendix D summarizes the differences between McDaniel's test instrument and the test instrument used for this study.

Design

Having outlined the experimental task proposed to analyze the effects of time pressure on attentional processes of auditors, the remainder of this section will detail the design considerations. Key topics in this section include the manipulation of the independent variable and the measurement of the dependent variables. Some of the content of the post-experimental questionnaire will also be discussed in this section.

As detailed in the previous sections, the literature on the effects of arousal predicts a narrowing of the range of attention under time pressure. Under conditions of time pressure, attention should become more focused on the data associated with the primary task of execution of the detailed

tests outlined in the audit program. This focusing is likely to come at the expense of the type of attention that permits the processing of meaning associated with data related to the subsidiary task of reviewing listings for quantities and amounts that appear unusual. Because individuals under time pressure are less likely to devote attention to the data at a level that facilitates the processing of the ecological properties (or meaning) of the stimulus, it is predicted that they will be less likely to detect and document the excess inventory build-up and Inventory Reserve omissions. Further, because of the findings of studies investigating the effects of arousal on dual-task performance, it is predicted that the decline in the performance of this subsidiary task will precede the decline in performance of the test of details.

Independent Variable

Time pressure, the independent variable manipulated in this experiment, was operationalized by restricting the time allowed for completion of the task. This method is consistent with the approaches of McDaniel and Waggoner and Cashell [1991]. The levels of time pressure imposed on the participants included positions on either side of the apex of the inverted-U shaped curve relating stress and performance. By allowing the participants in the four treatment groups 75, 65, 55, and 45 minutes to complete the experimental task, the desired range was likely to be achieved. These times are based upon both the results of McDaniel's experiment involving

a very similar task given to 22 pilot study participants and 90 practitioners and extensive pretesting of the proposed task. McDaniel's experimental groups were allotted 75, 65, 55, and 45 minutes to complete the task. In the lowest time pressure group (75 minutes) in McDaniel's task, participants used, on average, 86 percent of the time allotted for the task. In the 65, 55, and 45 minute time budget conditions, the respective averages of time used were 94, 96, and 99 percent of the allotted time. McDaniel's task required auditors to execute the detailed tests on more sample items than is the case in this task. As a result, imposing the same time constraints should have resulted in slightly less time pressure being experienced.

The reason that lower time pressure conditions were included is that performance of the subsidiary task (red flag detection) is predicted by psychology literature to be affected by increased arousal prior to the performance of the primary task (the tests of details). McDaniel, in order to examine the effects of time pressure on only the test of details performance, imposed time pressure at a level where test of details performance was impaired.¹⁷ Because the focus of this study was on the tasks that are hypothesized to be affected before the primary task of executing audit tests of details, time pressure was imposed at lower levels than in

¹⁷ McDaniel also examined the effect of another independent variable, audit program structure, and the two variables' interactive effect on test of details performance.

McDaniel's study. This study analyzes whether or not the task of red flag detection is affected at time pressure levels where performance of the test of details task is not affected. The measurements used to conduct such an analysis are detailed below.

Dependent Variables

Test of Details Performance

The measurement of effectiveness and efficiency of the test of details task performance, or primary task performance, is consistent with the model presented by McDaniel [1988, 1990] as described below. Audit effectiveness (denoted Y_1) is measured as the sum of the four individual audit effectiveness scores (Y_{1i}) relating to each of the audit program steps, and is calculated as follows:

$$Y_1 = (\sum_{i=1}^4 Y_{1i}), \text{ where}$$

$$Y_{1i} = ([(n_i - e_i) / n_i] \times 100) \times (n_i / n_i^*),$$

where

n_i = the number of items examined in procedure i , $i = 1$
- 4,

e_i = the number of auditor errors (i.e., incorrect rejections or incorrect acceptances) made in applying procedure i to each of the n_i items selected,

n_i^* = the sample size necessary to achieve the audit objective for procedure i .

As indicated above, the effectiveness score for each procedure is based upon 1) the number of items examined in the execution of the given audit program step, 2) the number of errors made in performing the audit program step, and 3) the sample size required by the audit program step. The first two factors are measurements obtained from participant documentation of activity. The third factor, the sample size required by the audit program step, is the number required to achieve the audit objective of obtaining 90 percent confidence that the true error rate for each error type does not exceed the tolerable error rate of 15 percent. Consistent with McDaniel's task, the sample size is that required to achieve the stated objective using a single stage fixed sampling plan [AICPA, 1983, p. 107]. Contrary to McDaniel's measurement, the participants will not be able to increase their audit effectiveness scores for this test of details task by examining more items than are required by the audit program. This condition ensures that the maximum score that could be achieved for each of the procedures requiring sampling is 100. This score would be attained if participants correctly process at least as many items as are required by each audit program step. The maximum score, then, is 400 (resulting from scores of 100 on each of the four procedures to be scored in this manner).

The overall audit effectiveness score is a product of components that McDaniel labels (1) nonsampling processing

accuracy ($[(n_i - e_i)/n_i] \times 100$) and (2) achieved sampling adequacy (n_i/n_i^*). The accuracy component may be of particular interest in identifying how well the procedures were performed independently of whether or not the procedure was actually completed. This analysis may lend insight into whether any performance decrements are a product of inadequate processing or merely an inability to complete the assigned procedures. Performance decrements associated with the inability to complete the audit procedures are not as interesting to this study except to the extent that the inability to complete the procedures may have been caused by slower processing under time pressure.¹⁸

Red Flag Detection Performance

Subsidiary task performance is related to the auditors' ability to detect and analyze the red flags present in the task. Recall that it was asserted that there are two ways in which the narrowing of attention under stress may manifest itself with respect to subsidiary task performance (discussed in section II.3.). It may be simply that fewer cues are attended to under time pressure, or it may be that fewer cues will be attended to at a level that permits the processing of their ecological properties. Several different methods of

¹⁸ As detailed in the analysis, there were performance decrements associated with an inability to complete assigned audit procedures. Further analysis revealed that auditors under pressure did not appear to execute procedures more slowly. This finding lends importance to the accuracy component as a measure of test of details task performance.

eliciting auditor responses have been incorporated into the task to measure the extent to which each of these effects occurs. The remainder of this chapter details these methods and the results obtained.

As discussed in the previous chapter, the red flags in this task are grounded in the incentives and opportunities described in the contextual environment as well as the data for the two "red flag" customers with unreported overstocks of inventory. While it is important for the auditor to recognize the incentives and opportunities in order to operate with an increased level of professional skepticism and to generate hypotheses about the nature of any irregularities that are detected, the main measure of performance of the subsidiary task is the extent to which the auditor recognizes the irregularities present in the data. As such, measurement of the extent to which auditors in each time pressure group attend to the data for the two "red flag" customers is central to the analysis of subsidiary task performance.

Measurement data was gathered from two main sources--the additional documentation and written comments provided by the auditors and the assessments made on a questionnaire administered at several intervals during the experiment. Both of these measurement sources will be outlined below.

First, the additional documentation provided by the auditors was analyzed and classified according to the extent to which the subjects noted the discrepancies in the records

for the two "red flag" customers. Each set of experimental materials was reviewed for indications that the auditor attended to the situation involving the two customers. Three different classifications that examine progressively deeper levels of processing were made.

The first such classification was designed to be the most sensitive to any indication that the auditor attended to any aspect of the situation involving the misstated customers. Each set of materials was thoroughly reviewed for any indication that the auditor noted that one (or both) of these customers was (were) different in any way from the others. The emphasis was on detecting any relevant marks made outside of the normal documentation of the detailed tests (e.g., circling of the inventory turnover ratio--which is exceptionally low--or the units on hand total--which is exceptionally high for the affected customers, extra calculations not associated with the tests of details for these customers, any notation of the need to investigate anything with regard to these customers). For the purposes of this measurement, any set of materials with any such relevant notations was classified as "detected." Any set without such notations was classified as "not detected."

The second classification was designed to capture a slightly deeper level of processing of the cues indicating the presence of irregularities. For an item to have been classified as "detected" with this measurement, there had to

have been some indication that the auditor realized that several items relative to one of the two "red flag" customers were left off the Reserve for Slow-Moving and Obsolete Inventory record and/or proposed an adjustment to correct the misstatement. Auditor documentation in this case needs to be more complete than it would with the first classification (e.g., several "X"s--indicating an error--in the "Reserve Item Omission" column of the task materials, preliminary calculations of the understatement of the reserve, or a note that an adjustment to the reserve would have to be made).

The final classification was made based on indications that the auditor considered some of management's incentives and opportunities to provide materially misleading financial statements. The analysis for this classification considered whether or not the auditor attempted to generate hypotheses as to how or why the misstatement was made and to what extent the financial statements are misstated (e.g., recognition of the incentives related to financial statement based compensation plans, increased competition, decreased profitability, the possible loss of major customers that could lead to going concern problems, the recognition of opportunities related to corporate diversity and divisional autonomy, top management involvement in routine inventory obsolescence entries, inappropriate audit procedures that failed to audit average monthly usage figures for the fourth quarter when conditions had changed). Again, if any of these considerations were

incorporated into a given auditor's analysis, it was classified as "detected." Those who do not progress to this level of understanding of the situation were classified as "not detected."

The second major type of measurement data comes from several, identical questionnaires that were administered at the 15 minute mark of the experiment and at ten minute intervals thereafter. A copy of this questionnaire is presented in Appendix E. These questionnaires asked auditors to assess the likelihood of material misstatement arising from each of the four types of errors seeded in the data and to assess the likelihood that material irregularities and/or financial fraud are present. This measurement was designed to provide information about the level of understanding obtained by the auditors as well. Those who did not indicate that there is a relatively high likelihood of misstatement due to omission of items from the reserve probably did not attend to the cues present in the data. Those who indicated that there is a relatively high likelihood of misstatement due to omission of items from the reserve but did not assess a high likelihood of irregularities or financial fraud probably did detect the omission of items from the reserve but did not assimilate the other red flags into the analysis. Those who assessed a relatively high likelihood to all three situations have probably attended to the indicators at a level that yields an understanding of their implications.

The reason that the questionnaires were given at the 15, 25, 35, 45, 55, 65, and 75 minute marks is that it enabled analysis of all of the different time pressure groups at the same point in time as well as at the end of the allotted time. While the frequent administration of the questionnaires allowed for measurements to be taken during the task, they may have increased the artificiality of the experimental environment. In addition, they may have induced the auditors to give greater attention to indicators of potential irregularities and financial fraud. These threats to the validity of the experiment may have been reduced since the questionnaires were given with the same frequency to each of the treatment groups.

CHAPTER 4

DATA ANALYSIS, DISCUSSION, AND SUMMARY

Data Analysis

Administration of the Experiment

The experiment was administered at five locations in November and December, 1993. Although the time between the separate administrations of the experiment provided the opportunity for history effects¹⁹ to threaten the internal validity of the experiment [Cook and Campbell, 1979], measures were taken to minimize any such effects that might be realized. One of these measures was the way in which the experimental materials were ordered and distributed. There were four different time pressure conditions and four different versions of the experimental materials. The fourth version of the 65 minute time pressure condition was selected at random as the first set of materials to be distributed. The remainder of the experimental packets were systematically ordered thereafter with the fourth version of the 75 minute condition next, the fourth version of the 45 minute condition after that, and the fourth version of the 55 minute condition after that. The third version of the 65 minute condition was next and the others followed the same order. The packets were then distributed, in this order, to the auditors as they arrived at the site, thus ensuring that virtually the same

¹⁹ History effects may occur when an observed effect may be attributable to events which occur in the time period between tests.

number of subjects would be assigned to each treatment condition at each administration site. By distributing the packets equally across treatment conditions, the firm effect and the history effect on results should have been minimized.

At each location, upon arrival the auditors were given an envelope containing experimental materials and were directed to take a seat in one of four areas of the room depending on the treatment condition assigned.²⁰ They were instructed to keep the envelope closed until they were given instructions to begin working. After they were seated, they were given the task instructions. These instructions were read aloud verbatim. Afterward, they were shown the timer that they should use to document the time taken on the task and were informed that an audit program in the experimental materials would indicate the total time allotted for the task. They were told that the materials differed among auditors and that they should be concerned only with the progress of their own work. Finally, they were instructed that they would be asked to complete a questionnaire every ten minutes and that time had been allotted in the audit program to respond fully to it. Following these instructions, they were told to open their packets and begin working on the assigned task. The final

²⁰ Although tighter control could have been exercised by segregating the treatment groups into two or four rooms, the one-room method did not appear to affect the results significantly. Interviews with participants indicated that they were generally unaware of the different completion times and were unaffected by the activities of other participants.

questionnaire given to each auditor in each participant group contained instructions to stop working, assemble the materials, and to place them in the envelope. They were given a post-experimental questionnaire and were instructed to complete it without referring to the experimental materials.

Of the 63 subjects, all but one completed the task satisfactorily. The one subject's materials were invalidated when he reopened his experimental materials and began marking on them after reading some of the questions on the post-experimental questionnaire.

Of the 62 remaining subjects, nine had less than one year of experience and three had over six years of experience. Because the task in the experimental materials was designed for individuals at the one year experience level or higher [McDaniel, 1990], and because the auditors were instructed to execute their assigned responsibilities as they would in a normal audit situation, individuals with less than one year of experience were excluded from the analysis. The auditors with over six years of experience were also excluded from the analysis based on the fact that at this level they have reduced responsibility for executing tests of details as designed in the experimental task. As a result, the final sample sizes were 14, 15, 11, and 10 for the 45, 55, 65, and 75 minute conditions, respectively. Interestingly, the random assignment of experimental materials produced a situation where all nine of the individuals with less than one year of

experience and all three of those with greater than six years of experience were assigned to the 65 and 75 minute conditions. Subsequent analyses exclude these subjects. Although the analysis to be reported in the following sections uses the reduced sample--that which excludes the nine auditors with less than one year of experience and the three auditors with more than six years of experience--each of these statistical tests was conducted on the full sample as well. In no case did the results of these tests produce a conclusion different from that obtained using the reduced sample (assuming an alpha level of .05). Table 1 presents the demographic data for the total sample and the sample upon which the analysis was conducted. There were no significant differences between treatment groups on any of these demographic items.

Manipulation Checks

In order to assess the successful manipulation of the construct of time pressure, manipulation checks of the independent variable were included in the post-experimental questionnaire. Consistent with McDaniel, the participants were asked "How much time pressure did you actually feel during the inventory exercise?" and "On average, how much time pressure do you feel in your daily work?" The participants were asked to respond on a seven-point scale with 1 representing "very little time pressure" and 7 representing "substantial time pressure." The means of the responses to

Table 1
Sample Demographics

| Demographic item | All subjects | Reduced sample | "Detected" * |
|--|--------------|----------------|--------------|
| Number of subjects | 62 | 50 | 6 |
| Months of public accounting experience | 35.45 | 31.28 | 34.50 |
| Age | 26.86 | 26.62 | 25.33 |
| Number of engagements providing experience with inventory testing | 10.61 | 6.92 | 8.67 |
| Number of subjects with Master's degree | 5 | 4 | 1 |
| Number of subjects previously involved in an audit in which the client had engaged in financial fraud | 3 | 1 | 0 |
| Number of subjects previously involved in an audit in which the client had a material irregularity | 13 | 11 | 1 |
| * "Detected" column contains information for those who were classified as detected under the first measure of subsidiary task performance because they documented anything unusual about the two "red flag" customers. | | | |

the first question are expected to increase with increasing levels of time pressure. The means of the responses to the second question should have been constant across all treatment groups.

Based on McDaniel's findings, it is expected that auditors generally will indicate that they experience more time pressure on the job than they did during the experiment

and that the difference should decrease as the time allotted for completion of the task decreases. To the extent that auditors with more than one year of experience generally have been exposed to similar time constraints in their daily work, the measurement of the difference in reported levels of time pressure may provide a better measurement than the direct question on the amount of time pressure actually experienced.

Although the mean level of time pressure actually experienced in completing the experiment increased, as expected, with decreases in the time allotted, the one-way analysis of variance (ANOVA) indicated that the effect was not statistically significant ($p \leq .37$). Additionally, the difference between the mean of the reported level of time pressure experienced by those in the 45 minute group (4.21) was not significantly different from that of the 75 minute group (3.30) ($t_{(d.f.=22)} = 1.03, p \leq .31$). Similar findings were obtained using the measurement of the difference of time pressure experienced during the experiment and in daily work. The ANOVA indicated that the manipulated level of time pressure did not produce a statistically significant effect in the differences between experimental and daily work related time pressure ($p \leq .20$). The mean difference in time pressure for the 45 minute group (-0.36) was not significantly different from that of the 75 minute group (-2.00) ($t_{(d.f.=22)} = 1.66, p \leq .11$). These results indicate that it would be inappropriate to conclude that the independent variable of

time pressure was appropriately manipulated between the four groups. As a result, an analysis was undertaken to determine which groups experienced significantly different levels of time pressure.

A *post hoc* analysis of the responses to the experienced level of time pressure revealed that the greatest difference was found between the 55- and 65-minute time pressure conditions. This result was consistent with pretest findings indicating that the mechanical execution of the procedures took about 45 minutes and the reading of the materials took about ten minutes. It was also consistent with the result reported by McDaniel [1988, p.58] that subjects averaged between 2.6 and 2.9 items processed per minute. Given that auditors were asked to process 150 items in the dissertation instrument, the execution of the task should have taken between 58 and 52 minutes. Because of this apparent dichotomy and the lack of significance of the results when analyzed across four groups, an analysis of time pressure was repeated on the data when the 45- and 55-minute conditions were consolidated into one "high" time pressure condition, and the 65- and 75-minute groups were consolidated into one "low" time pressure condition.

When the subjects are classified in this way, the mean difference between the level of time pressure experienced during the experiment and the time pressure experienced in daily work for the high time pressure group (-0.28) was

significantly different than that of the low time pressure group (-1.80) ($t_{(d.f.=47)} = 2.21, p \leq 0.032$). As discussed previously, the key to the design of an experiment is the valid manipulation of the independent variable. In this experiment, the conclusion that the subjects experienced a greater amount of time pressure as the time allotted was decreased is valid only when the data are aggregated into two groups and measured by the difference metric described above. As a result, all subsequent statistical analyses will be conducted only on the aggregated data. Consistent with McDaniel's findings and my expectations, the mean reported level of time pressure experienced in daily work for the high time pressure group (4.58) was not significantly different from that of the low time pressure group (5.00) ($t_{(d.f.=47)} = -0.96, p \leq 0.341$), suggesting a homogeneous sample.

Test of Details Performance

Having explained the manipulation of the independent variable, the discussion now shifts to the results associated with the dependent variables. Test of details effectiveness, or the output measure associated with what was theorized to be the primary task, was a function of processing accuracy and sampling adequacy. While the overall measure of test of details effectiveness for the high time pressure group (354.85) was significantly lower than that of the low time pressure group (380.57) ($t_{(d.f.=48)} = -2.20, p \leq 0.033$), it is unclear as to whether the difference is a result of an actual

decline in the proficiency with which audit tests were executed or rather a result of truncated procedures. That is, the test of details effectiveness measure may be over-sensitive to the truncation of procedures due to time constraints. It is possible that auditors under high time pressure were executing procedures with equal speed and accuracy but were simply cut short by the time constraint. In this case, despite the lower overall effectiveness score, it may not be appropriate to conclude that they achieved a lower level of performance on the test of details task. The self-reports of time taken to complete each of the audit steps helps to illuminate this issue.

This issue arises because the self-reported average time taken to complete the task for the low time pressure group was over 58 minutes--well in excess of the time allotted for the high time pressure group. In addition, analysis of self-reports, detailed in Table 2, indicated that 15 out of 29 subjects under high time pressure did not report a time for the completion of all of the audit steps. The corresponding ratio in the low time pressure group was four out of 21. Furthermore, an analysis of the self-reported time taken to complete all but the last of the assigned procedures revealed that the mean total time reported for the high time pressure group (36.81 minutes) was significantly lower than the mean for the low time pressure group (44.68) ($t_{(d.f.=32,31)} = -3.60, p \leq$

0.002).²¹ These results indicate that the lower audit effectiveness scores for the high time pressure group, while most likely due to the inability of the auditors to complete all of the assigned procedures, are not a result of slower processing. In fact, the self-reports indicated that those under high time pressure executed the first three procedures faster than those under low time pressure.²²

Table 2
Analysis of Time Taken to Complete
Audit Program Steps

| Treatment group | Sample size | Number completing all steps (within 10 items) | Self-reported time to complete all steps | Self-reported time to complete all but last step |
|-----------------|-------------|---|--|--|
| 45 | 14 | 6 | 44.2 (n=6) | 33.6 (n=13) |
| 55 | 15 | 8 | 51.1 (n=8) | 40.0 (n=13) |
| 65 | 11 | 8 | 55.1 (n=8) | 43.0 (n=10) |
| 75 | 10 | 9 | 61.6 (n=9) | 46.6 (n=9) |
| Total/Avg | 50 | 31 | 53.84 (n=31) | 40.1 (n=45) |

²¹ Because Levene's test for equality of variances was significant ($F = 4.25$, $p = < 0.045$), the separate variance t test is reported here. The pooled variance t test was virtually identical. Six auditors, three in each group, were excluded from the analysis because they did not self-report the time spent on all of the steps included in the analysis.

²² Because most of those who ran out of time failed to complete the final assigned procedure, self reports were not available over all four steps for all auditors.

It appears then that significant difference in the overall audit effectiveness scores observed between groups may not be the result of decreased efficiency in the execution of the tests of details but rather the result of a truncation of the execution of the procedures induced by the time constraint. The following analysis examines the processing accuracy component of the effectiveness score to identify whether the lower effectiveness scores are due to lower accuracy or simply uncompleted procedures.

As the measure of audit effectiveness can be broken down into an accuracy component and a sampling component, it may be appropriate to consider the accuracy component as a measure of the proficiency with which the actual audit test of details task is executed. Recall that the measure of accuracy is the ratio of correctly processed items to total items processed times 100 for each audit procedure. As a result, a score of 400 is again the maximum score that may be attained. Theoretically, this score could be attained by processing only one item (correctly) for each of the four procedures for which documentation was required.²³ To ensure that the results would not be biased by such an approach, the data were examined to determine if any subject appeared to be operating

²³ A fifth audit program step, that of reviewing the records for items, products, amounts, and customers that appear unusual was also included on the audit program. Because this step is primarily associated with what has been theorized to be the subsidiary task, red flag detection, this step is not referred to in this portion of the analysis.

with such a strategy. All subjects appeared to review the materials and attempt to complete at least three of the test of details procedures. Apparently nine subjects were unable to fully complete one of the four procedures. All of these subjects apparently attempted to complete the other three steps. Three subjects were excluded from the analysis because they did not provide any documentation for one of the audit steps.²⁴ The results of the pooled-variance t-test indicated that there was no significant difference in the mean level of accuracy between the high (397.11) and the low (398.47) time pressure groups ($t_{(d.f.=45)} = -1.15, p \leq 0.257$). Because Levene's test for equality of variances was marginally significant ($F = 3.336, p \leq 0.074$) a separate-variance t-test was also run. The results similarly indicated that there was no significant difference between the two groups ($t_{(d.f.=42.62)} = 1.20, p \leq 0.235$). These results depart from McDaniel's finding that processing accuracy decreased significantly from low to high time pressure among subjects who attempted to execute procedures in accordance with an audit program. Recall that this study

²⁴ The measure of accuracy requires the division of the number correctly processed by the total number processed for each step. The accuracy score could not be computed for those who did not process any items for one of the steps because it would create a situation where the denominator was zero. The analysis was also run by calculating an accuracy score where the totals were aggregated, thus eliminating the division by zero situation. The results under this analysis were not significantly different from the results reported in the text. The former method was reported in the text to be consistent with the measurements provided by McDaniel.

intended to manipulate time pressure at a lower level than did McDaniel's. It is possible that time pressure was manipulated at a level where accuracy was not affected as greatly.

A separate analysis of the overall test of details effectiveness scores was run on only those individuals who essentially completed all of the audit program steps upon which the score was based. This test redefines accuracy as processing without error and processing the assigned number of items. That is, it considers both errors of commission and errors of omission (e.g., a subject who processes 72 out of 75 assigned items with one mistake in processing would be classified as having made four errors under this measurement as opposed to one error under the previously reported measurement). It removes from the analysis those who simply did not get close--defined as within ten inventory count, reserve, or pricing items of the number assigned--to completing one or more steps.²⁵ The mean of the test of details effectiveness scores for the high time pressure group (393.80, $n = 14$) was not significantly different from the mean of the test of details effectiveness scores for the low time

²⁵ The cut-off point of ten items was selected because it allows for auditor miscounts of the number of items selected. For example, it is possible that the auditor would examine 73 items for a procedure in which 75 was the assigned number. In this case, the explanation that the auditor simply miscounted the number of items selected is more likely than the explanation that the auditor failed to complete the procedure. The analysis was performed using a cut-off point of five items with very similar results.

pressure group (395.21, $n = 17$) ($t_{(d.f.=29)} = -0.55$, $p \leq 0.589$). As would be expected, this analysis excluded more individuals from the high time pressure condition (15) than it did from the low time pressure condition (4).

Table 3 summarizes the major hypotheses tested relative to the test of details task, the *a priori* expectations, the results obtained, and the overall level of significance of the t-tests. Taken as a whole, these results appear to indicate that time pressure was imposed at a level that did not significantly affect the manner in which the test of details were performed. Time pressure, as it was operationalized in this task, appeared to affect the extent to which auditors completed the task but not the level of accuracy with which items were processed.

Table 3
Hypotheses, Results, and Significance Levels
for Tests of Details Performance

| Research hypothesis | | Result | p-value |
|---------------------|--|---------------|----------------|
| H ₁ | There will be no difference in the test of details effectiveness scores for the low and high time pressure groups. | difference | $p \leq 0.024$ |
| H ₂ | There will be no difference in the test of details accuracy scores for the low and high time pressure groups. | no difference | $p \leq 0.235$ |
| H ₃ | Among those who essentially completed all assigned audit steps, there will be no difference in test of details effectiveness scores for the low and high time pressure groups. | no difference | $p \leq 0.589$ |

While these results may appear to conflict with the results presented by McDaniel, the apparent inconsistency may be resolved when one recognizes that this study did not attempt to replicate McDaniel's results. The dissertation test instrument was based upon McDaniel's, but the changes that were made to the instrument and the differing goals with regard to the manipulation of the independent variable of time pressure precluded the replication of results. The changes made to the test instrument were discussed in a previous section. The differences in the manipulation of the independent variable are discussed below.

McDaniel examined the effects of time pressure on the single cognitive task of executing tests of details. This study examined the effects of time pressure in a dual cognitive task environment in which the execution of auditing tests of details was the primary task and the detection of red flags was the subsidiary task. The theory predicted that as time pressure increased, attentional resources would be diverted from the task of attending to red flags to the test of details task. Thus, the prediction was made that auditors under high time pressure would suffer performance decrements, relative to the low time pressure group, on the task of attending to red flags but would not show a decline in performance on the test of details task. In order to observe this effect, time pressure needed to be manipulated at levels where performance decrements on the test of details task were

not expected to occur. McDaniel's intended manipulation of time pressure was designed to include levels at which the test of details task was affected, however. Alternatively stated, while McDaniel expected to find a decline in performance for the high time pressure group, this study did not.²⁶ The results presented above are consistent with those expectations.

While this explanation is intuitively appealing, it may not fully explain the observed results. The conclusion that time pressure was manipulated at a lower level in this study, thus not producing the negative effects on test of details processing accuracy that were observed by McDaniel, does not explain why a high number of individuals in the high time pressure group failed to complete the task. One possible explanation is that the task materials used here contained horizontal lines under each inventory item, thus making it easier to follow the data for a particular item across the page. McDaniel's result may have been more heavily influenced by decreases in visual acuity associated with increased time pressure. Given the cosmetic changes in the materials, it is possible that a higher level of pressure would have been necessary in order to observe decreases in the proficiency

²⁶ Recall that while the actual amounts of time allotted for completion of the task was the same between studies, the tasks were different. McDaniel's study required the examination of more items within the tests of details. As a result the same time restriction was expected to create less time pressure in this study.

with which tests of details were executed. Whatever the explanation, the point remains that McDaniel's results indicate that there is a level of time pressure at which the proficiency of execution of audit tests of details will be affected. The results reported here indicate that this level of time pressure was not reached in this experiment, thus setting the stage for the analysis of whether the proposed subsidiary task of attending to red flags was affected.

Red Flag Detection Performance

The analysis now focuses on what was theorized to be the subsidiary task, that of attending to red flags. The first measurements to be considered are those associated with the documentation provided by the auditors in the experimental materials. The first measurement purported to capture any attention at all that may have been given to the two customers for whom the inventory records were likely to be misstated. Each of the experimental packets was evaluated as a whole and classified as either "detected" or "not detected" based on whether or not any notation was made that distinguished at least one of these customers from the others.

As the data from this classification is clearly nominal, a Chi-square test of independence may be appropriately applied for analysis. The assumption of normality that underlies the Chi-square test is dependent on the expected frequencies in each of the cells of the contingency table. In order to allow the discrete Chi-square test statistic to approximate the

continuous Chi-square function, the expected frequency of each cell needs to be quite large. The generally accepted rule for the application of the Chi-square test is that it should not be employed when greater than 20% of the cells have expected frequencies of less than five [Siegel, 1956]. More conservative guidelines indicate that an expected frequency of five is the minimum acceptable frequency [Howell, 1982; Conover, 1971].

Panel A of Table 4 presents the data arranged in contingency table format. Because 50% of the cells had an expected frequency of less than five, this statistic may not be appropriately applied. As a result, Fisher's exact probability test was used to analyze whether the two groups differ in the proportion with which they fall into the two classifications. The results of the Fisher's exact test ($p \leq 0.040$) indicated that the two groups differ with respect to the probability that their members will be classified as "detected." The implication is that auditors under time pressure may be less likely to report the cues signalling possible misstatements. This finding is consistent with the hypothesized effect of time pressure and thus lends support to the theory predicting that, under arousal, attention will become more focused on primary-task-related activities at the expense of subsidiary-task activities. This result would appear to confirm the Treadway Commission's point regarding the pressures that may not be conducive to the recognition of

indications of possible improprieties. Demographic information for the auditors who were classified as "detected" under this measurement is presented alongside the other demographic information in Table 2.

This measurement of subsidiary task performance captured a very low level of recognition. That is, it measured whether the auditor recognized that the referenced items appeared unusual or different without taking into account whether or not the auditor understood that they were preliminary indications of impropriety. The measurement that takes into account the auditor's recognition of the referenced items as indicators of possible financial statement misstatements is discussed below.

The second measurement of subsidiary task performance required some understanding of the financial statement implications in order to achieve a "detected" classification. Panel B of Table 4 presents the data arranged in contingency table format for this measurement. Again, Fisher's exact probability test was used to analyze differences between the groups. The results again indicated that the two groups are significantly different with respect to the probability that their members will be classified as "detected" ($p \leq 0.026$). Alternatively stated, auditors under high time pressure were less likely to attend to and understand the implications of red flags than those under low time pressure. This finding is also supportive of the research hypothesis.

Table 4

Contingency Tables: Red Flag Detection Performance

Panel A: Measurement One--Documented Anything Unusual

| Performance | Time Pressure Level | | |
|--------------|---------------------|-----|----|
| | High | Low | |
| Not Detected | 28 | 16 | 44 |
| Detected | 1 | 5 | 6 |
| | 29 | 21 | 50 |

"Detected" = Documented anything unusual about either of the two "red flag" customers

Panel B: Measurement Two--Understood Misstatement

| Performance | Time Pressure Level | | |
|--------------|---------------------|-----|----|
| | High | Low | |
| Not Detected | 29 | 17 | 46 |
| Detected | 0 | 4 | 4 |
| | 29 | 21 | 50 |

"Detected" = Documentation indicated that there may be a misstatement with regard to one or both of the "red flag" customers

No statistical analysis was conducted on the third measurement of subsidiary task performance in the sequence because none of the auditors provided sufficient documentation to conclude that an understanding of the opportunities and incentives was integrated with the cues in the data. Reasons why this result was observed are presented in the discussion section. Table 5 summarizes the major hypotheses tested relative to the documentation provided on the red flag detection task, their *a priori* expectations, the results obtained, and the overall level of significance of Fisher's Exact tests. Taken as a whole, the results would tend to indicate that subjects under time pressure were less likely to provide documentation that either identified the "red flag" customers as being unusual in any way or identified the "red flag" customers as potentially misstated. In short, time pressure did appear to affect performance of the red flag detection task.

In addition to the output measures associated with the documentation provided by the auditors discussed above, questionnaires were issued during the experiment to elicit assessments of the likelihood of misstatement due to each of the error conditions in the data and the likelihood of fraud and irregularities. The following discussion details the analysis of the data provided on the questionnaires.

In order to determine whether the level of time pressure affected the detection of the consistent omissions from the

Table 5

Hypotheses, Results, and Significance Levels
for Red Flag Detection Performance

| Research hypothesis | | Result | p-value |
|---------------------|--|---------------|---------|
| H _{b1} | The high and low time pressure groups will differ with respect to the probability that their members will be classified as having noted anything unusual for the two "red flag" customers. | difference | p≤0.040 |
| H _{b2} | The high and low time pressure groups will differ with respect to the probability that their members will be classified as having documented that there is a potential misstatement with regard to at least one of the "red flag" customers. | difference | p=0.026 |
| H _{b3} | The high and low time pressure groups will differ with respect to the probability that their members will be classified as having documented the incentives and opportunities present for committing irregularities. | no difference | n/a |

reserve record for the two "red flag" customers, the average assessed likelihood of material misstatement due to omission from the reserve was compared across groups. Separate analyses were conducted on the averages computed from the 45 minute questionnaires for all groups, the 55 minute questionnaires for the three groups who completed them,²⁷ and the final questionnaire completed by each group.

²⁷ Because those in the 45 minute time restriction condition were not asked to complete a 55 minute questionnaire, this group was omitted from the analysis.

Additionally, the average difference between the assessed likelihood of material misstatement due to omission from the reserve and the average assessed likelihood of the other three sources of misstatements, were compared across groups. Again, separate analyses were conducted on the averages computed from the 45 minute questionnaires for all groups, the 55 minute questionnaires for the three groups who filled them out, and the final questionnaire filled out by each group. This analysis most directly parallels the second measurement based on auditor documentation--that of the number of auditors who noted that there may be a material misstatement relative to the two customers with excess units on hand. Because more factors can affect the questionnaire responses, the questionnaire is a less direct method of measuring attention to the indicators of a misstatement. If significant results were to be attained, however, it would reinforce any significant result obtained from the other metric. The following discussion details the analysis of the questionnaire items designed to approximate the third measurement based on auditor documentation--that of the number of auditors who integrated their understanding of the incentives and opportunities to commit irregularities into their documentation.

To determine whether time pressure affected the auditors' ability to recognize the misstatements as intentional, the average change in assessed likelihood of irregularities was

compared across groups. The average change in assessed likelihood was calculated from the difference between the assessed likelihood of irregularities on the 15 minute questionnaire and the assessed likelihood on the later questionnaires. Again, separate analyses were conducted on the average changes computed from the difference between the 15 minute and 45 minute questionnaires for all groups, the 15 minute and 55 minute questionnaires for the three groups who filled them out, and the 15 minute and final questionnaire filled out by each group. The same analysis was conducted on the assessed likelihood of financial fraud.

None of the analyses related to the questionnaires issued during the experiment as discussed above provided significant results. Generally the differences were very small and in some cases in the opposite direction from what was expected. This failure to reject may have been due to several factors. One factor was that, according to the analysis of auditor documentation, only four of the auditors (all in the low time pressure condition) detected and understood the apparent financial statement implications of the items omitted from the reserve. In addition, several auditors who did not attend to the potential irregularity achieved results of audit tests indicating that the reserve was likely to be understated. The fact that auditors were instructed to select their own sample items from each page may have created a situation where their sample may have included several items that were improperly

omitted from the reserve. In this situation, an assessment of a high likelihood of misstatement due to omission from the reserve would be appropriate. Such an assessment may have diluted any effect that the responses of those who attended to the potential irregularity might have had. In addition, even those who did attend to the indicators of potential irregularities appeared to be hesitant to label the situation as an irregularity or especially a financial fraud. This finding will be discussed further in the following section.

Discussion of Results

Having presented the statistical analysis of the data, the focus now shifts to a discussion of these results and some of the procedures that were aimed at discovery rather than traditional hypothesis testing. A question could arise with regard to whether the detection and/or investigation of unusual items relative to the two potentially improperly reported customers was done concurrent with or subsequent to the execution of audit procedures. This consideration is important because the theoretical development discussed the effects of time pressure on the range of attention. Specifically, it was asserted that auditors under low time pressure were more likely to be attentive to a broad range of cues while executing tests of details than were those under high time pressure. The significant results that were obtained would not be attributable to the effects of time

pressure on attention, however, if the indicators of potential fraud were attended to after completion of the test of details tasks. If, for example, an auditor in the low time pressure group who was classified as "detected" first executed all of the tests of details in 55 minutes and then went back and found an unusual item while browsing through the materials for the remaining 20 minutes, this result would have little bearing on the range of attention. It would be inappropriate to say that this auditor was more attentive to red flags while executing tests of details. It would simply mean that auditors with excess time on their hands may be more likely to uncover red flags. In audit practice, however, it is very rare that auditors will spend extra time on "completed" procedures as there is always another set of procedures waiting. If, on the other hand, the auditors under low time pressure were to provide documentation demonstrating that red flags were attended to during the execution of tests of details during the first 45 minutes, it would reinforce the conclusions drawn from the significant statistical results discussed earlier.

In order to monitor when the documentation of the potentially misstated customers occurred, the auditors were instructed to use regular graphite pencils for the first 45 minutes and different colored pencils for each of the ten minute intervals thereafter (the pencils were provided to

them).²⁸ The color of the documentation provided information on whether those who were classified as "detected" in the previously described process detected and investigated the items during the normal execution of audit procedures or whether they did so only after completing all audit steps. Alternatively stated, this measurement technique was used to assess whether the primary and subsidiary tasks were performed concurrently or sequentially.

In each of the six cases where an unusual item was identified, the auditor provided documentation indicating that it was detected within the first 45 minutes. This result may indicate that the significant difference obtained for this measurement was not simply due to the case where the auditors under low time pressure had more time to go hunting for problems at the end. Rather, it indicates that auditors under less time pressure may be attentive to a broader spectrum of cues that may be present in the data as they execute audit procedures. This result would be consistent with the theoretical development that predicted a narrowing of the range of attention under time pressure.

The analysis of the timing of documentation was also conducted on those who demonstrated an understanding of the red flags, that is, those who were classified as "detected"

²⁸ All but two individuals complied with these instructions. Exit interviews and a review of their self-reported time provided information on when documentation was made.

under the second measurement. In three of the four cases where an understanding of the potential financial statement misstatement was documented, the documentation was provided within the first 45 minutes.

Insight into the issue of perceived deficiencies in the area of attending to red flags may also be gained by considering possible explanations for why none of the auditors carried the investigation to the point where the incentives and opportunities for committing irregularities were considered in the analysis of the potential misstatements. This tendency to avoid such an analysis did not appear to be due to time pressure, as three of the four auditors who were classified as "detected" under the second measurement indicated that the time pressure during the experiment was quite low (all three responded that the time pressure was at "2" on a seven-point Likert scale with "1" representing "very little time pressure"). Furthermore, none of the four who self-reported the time spent on each audit procedure indicated that there was a shortage of time. In fact, their self-reports indicated that they finished three, six, eight, and 22 minutes before time was called. The implication is that there would have been plenty of time for these individuals to relate the potential misstatement to the information in the task materials that referred to opportunities and incentives to commit irregularities.

Possible explanations for their failure to take the analysis to a higher level are that the auditors did not consider such an effort to be within the scope of their responsibilities in the artificial experimental context or that they were simply impervious to the indications of incentives and opportunities for irregularities and did not understand the implications of the potential misstatement, or a combination of both. In order to analyze the possible reasons why a deeper level of analysis was not conducted, the documentation relevant to the potential misstatement is reproduced in Appendix F for each auditor who was classified as "detected" by either of the measurements. Appendix G provides an example of the type of analysis that integrates the contextual information on incentives and opportunities for irregularities into the documentation. It is presented as the "optimal" analysis in that it highlights the indicators of potential irregularities identified in SAS 53 [AICPA, 1992] that are present in the case and provides a recommended course of action.

From the documentation displayed in Appendix F, it appears that the auditors were either awaiting the opportunity to discuss the matter with supervisors or the client or deferring the matter until additional documents could be examined. Clearly there were not enough materials present in the audit task to make a final determination as to whether this hypothetical client was indeed involved in

irregularities. It is possible that no such investigation was undertaken because they did not feel accountable for doing so in an artificial experimental context.²⁹ It is concerning, however, that a deeper level of analysis was not undertaken given that (1) the task materials included several statements emphasizing that they were to follow up on procedures and document results just as they would in an actual audit situation, (2) they were instructed that the only way in which they could communicate their findings was through the documentation in the materials, and (3) all of the auditors appeared to have additional time to investigate more deeply any situation of concern to them.

There are two reasons why this result is of concern. First, without a deeper investigation and richer documentation, the situation may not be attended to by a reviewer of the working papers, especially in cases where the documentation also includes references to other, more trivial, types of errors. Because reviewers face pressures similar to those executing detailed audit procedures, a given stimulus (in this case documentation of the potential irregularity) needs to possess relatively strong psychophysical, collative, or ecological properties in order to draw attention. Second, when the auditor lacks an awareness of the incentives and opportunities for irregularities present in the client's

²⁹ Earlier discussion detailed how the task of potential financial fraud detection may not be one for which auditors feel accountable in actual audit practice.

environment, the auditor is less likely to execute the follow-up procedures with an appropriate degree of skepticism.

To illustrate, the recommendation given in Appendix G discusses the follow-up procedure of examining sales invoices and other records of sales activity for the fourth quarter of the fiscal year under audit and the subsequent first quarter. This procedure was most likely analogous to the procedure used at interim to audit average monthly usage figures over the first three quarters. Given the situation, however, it would most likely be inappropriate to conduct the follow-up procedures with the same level of skepticism as the tests at interim. Whereas the invoices examined at interim could have been scanned for the quantity, price and overall genuineness, the invoices examined in the follow-up procedure should be carefully scrutinized. In addition to verifying the prices and quantities, the auditor should carefully analyze the prenumbering sequence, to see if the invoices in question could have been produced on the asserted date. Signatures should be scrutinized more closely, and the documents should be checked for any indications of tampering. The auditor who is unaware that the likelihood of irregularities is relatively high, given the incentives and opportunities present, is less likely to exercise procedures with this appropriate level of skepticism.

Summary

Evidence reported here suggests that time pressure may cause auditors' attention to become focused on cues related to test of details tasks at the expense of attention to red flags. This conclusion is based upon evidence that the proficiency with which auditors executed the test of details task (as measured by processing accuracy) did not suffer under time pressure but the proficiency with which they detected and investigated the red flags did decline. The fact that all of those who detected these indicators did so within the first 45 minutes of the experimental task regardless of the time constraints that they were under lends support to the contention that those under less time pressure attended to a broader range of cues while executing the detailed tasks.

CHAPTER 5
CONTRIBUTIONS, IMPLICATIONS, LIMITATIONS,
AND EXTENSIONS OF RESEARCH

Overview

This study was conducted to investigate the effects of time pressure on auditors' attention to red flags in a dual-task environment. It was predicted that under time pressure attention would become more focused on the primary task, (i.e., an auditing test of details type of task) at the expense of attention given to the subsidiary task (i.e., a task of attending to red flags). Several authoritative sources were cited that supported this conceptualization of primary and subsidiary tasks in the auditing environment. The theoretical development described the effects of time pressure as consisting of an element that causes the attentional field to be narrowed thus creating a situation where fewer cues are noticed at all, and an element that causes individuals to filter out stimuli that complicate the task at hand. The terms pre-attentive filtering mechanism and attentional coping mechanism, respectively, were advanced to describe these two effects. The Treadway Commission [1987, p. 25] implicitly referenced both of these effects when it indicated that independent accountants did not detect or investigate with skepticism items that may have indicated the presence of material misstatements and advanced time budget pressure as one possible cause of these behaviors.

This research reported evidence consistent with the theory that predicted a decrease in the performance of the task of attending to red flags (secondary task) would occur while the accuracy with which the test of details task (primary task) would be performed would remain stable. This decrease in the performance of the red flag detection task was observed at two levels--the level at which anything at all unusual was attended to and documented and the level at which the unusual customers were linked to a potential misstatement of the financial statements. The nature of the documentation provided also permitted insight to be gained relative to the manner in which potential misstatements may be handled in audit situations.

Contributions

Several prominent researchers in the area of accounting have called for research investigating the context in which accounting takes place [Hogarth, 1991; Ashton et al., 1988; Dopuch, 1992; Lord, 1992]. This research has attempted to be responsive to this call by studying the contextual feature of time pressure in auditing. In addition to incorporating time pressure, this research also considered the dual nature of the auditor's role as a significant feature of the contextual environment. Support for the assertion that the task of attending to red flags takes place in a dual-task or multiple-task environment was provided by statements of the Public Oversight Board of the SEC Practice Section of the AICPA,

Treadway Commission, Auditing Standards Board, and surveys of practicing accountants. Drawing upon a well established line of research incorporating the dual-task paradigm in studying the effects of arousal on attention, this research attempted to predict the effects of time pressure on auditor attention to red flags in this experimental context.

Implications

It is not the purpose of this dissertation to reject the idea that time pressure can be effectively imposed to promote operational efficiency and effectiveness in the auditing environment. Clearly, a certain level of arousal is necessary in all tasks to reach the optimum level of performance. Time pressure can be a very effective method of inducing such arousal, especially for tasks that do not require that attention be given to the "big picture." The Yerkes-Dodson Law states that the optimum level of arousal for complex tasks is lower than the optimum level of arousal for simple tasks. Based on this concept, an attempt should be made to tailor the level of arousal induced to the type of task being performed.

Accounting firms should be aware not only of the effects of time pressure on their employees, but also on entire firms as well. The level of litigation and the government attention being given to the profession may create a tendency to reduce the range of cues to which firms attend as well. They may become more concerned with "bottom line" type of considerations than they would under less stressful conditions

[Weick, 1983]. The time budget, which often represents the billable hours for the firm, is one factor that contributes heavily to the "bottom line." Weick [1983, p. 359] indicates that such a response is likely to occur:

As economic times get worse, there is a strong tendency to tighten controls. Budgets are cut, people are fired, products are dropped, amenities are canceled, and all of this is accompanied by much closer scrutiny of all operations that remain. This tightening of the control system both intensifies the stress any remaining person feels and also makes it harder to invent a response that can reverse the process.

The implication of this study is that excessive emphasis on the time budget and the production of documentation associated with tests of details can cause auditors to lose sight of overall audit quality. Because of the relative infrequency of red flags and the lack of a means of measuring attention to them in a normal audit situation, there may be a tendency to overemphasize the objective measurement provided by the time budget in the performance of test of details types of tasks. Such an emphasis can result in a subordination of the task of giving attention to red flags to that of generating the documentation required of audit tests of details.

Limitations

This research was concerned with the effect of time pressure on auditors' ability to detect red flags. This study did not attempt to provide evidence that would permit a general statement to be made on how well auditors execute this task. The only references made in regard to how well auditors execute this responsibility were reiterations of the public

statements and pronouncements made by such groups as the Board of Directors of the AICPA, The Public Oversight Board, and the Treadway Commission. While care was taken to design the task to be analogous to an actual audit situation, it would be inappropriate to generalize the findings relative to this case too greatly.

This study reported evidence supporting the existence of a pre-attentive filtering mechanism, as there was a significant difference in the number of individuals indicating that they noticed anything at all unusual about the inventory records for the potentially misstated customers. The study could not make a strong case for the existence of an attentional coping mechanism. This arises from the fact that it could not be determined that time pressure plays a role in preventing those who detect unusual items from investigating them to the point where they can determine that there is a potential misstatement. The data provide little insight on this matter because only one auditor under high time pressure even detected anything unusual. That is, because only one auditor under time pressure noted any unusual items, it is difficult to say whether or not time pressure would cause auditors to forsake the deeper investigation of apparently unusual items in favor of completing test of details types of procedures. Although the theoretical development suggests the existence of an attentional coping mechanism and the Treadway

Commission implicitly referenced such an effect, the evidence was insufficient to conclude that it exists.

These results do not imply that red flags will not be detected in audits where time pressure is high. This study did not permit auditors to use the decision aids, or tools and other procedures that might be highly effective. It was not possible to predict what type of mediating effect these tools may have. Also, this study did not incorporate the supervision and review dimensions of the auditing environment. These are two procedures that are explicitly required by Generally Accepted Auditing Standards to ensure an acceptable level of audit quality. The documentation provided by the auditors indicated that they may have been awaiting instructions from a more senior auditor. The implications of this limitation were discussed fully in a previous section. An additional limitation arises from the fact that audits are normally conducted in an audit team situation. This experiment did not allow for any interaction between auditors and thus its generalizability may be limited.

Despite efforts to preserve the ecological validity of the task, it is possible that the auditors who participated in the experiment did not view the task as realistic, thus limiting the conclusions that can be drawn from this research. One way in which ecological validity may have been impaired is through the frequent administration of the experimental

questionnaires. These may have been disruptive in that they affected the continuity of work.

In addition to the concerns over the ecological validity of the experiment, there were several threats to its internal validity as well. Particularly, having to administer the experiment in several different settings introduced threats that may not have been present in a more controlled setting. Differences in the way in which the instructions were read, the time of the day, the questions asked and peer attitudes may have affected the results. Having members of different treatment groups in the same room may have confounded the manipulation of the independent variable, as those under low time pressure may have noted that others were completing the task before them.

Extensions

Many of the limitations discussed above may actually be an opportunity for extension of this study. As such, this study is seen as the first in a line of research that investigates factors influencing auditors' ability to detect red flags. The materials may be able to be revised so that a larger proportion of the auditors might detect something unusual for the two questionable customers. Such a result would allow the attentional coping mechanism to be more fully tested. Future administrations of the experiment may allow for the use of audit tools or collaboration in a group environment. Other opportunities for extension of this study

arise from the nature of dual-task paradigm research into the effects of arousal on attention. Time pressure is just one of several possible arousing agents that could be analyzed within this paradigm. Future extensions could incorporate others of these individually and jointly with time pressure. Also, opportunities exist for refinement of the operationalization of the construct of time pressure. In keeping with past research into time pressure, this study operationalized the construct by restricting the allotted time. There may be other ways of inducing time pressure as well.

Conclusion

The Public Oversight Board, a group dedicated to the preservation of the quality and integrity of the audit process, has identified the issue of red flag detection as a major concern facing profession. The following statement, in the context of financial fraud, reflects the board's attitude toward the issue:

The Board believes that, to a greater extent than it now does, the profession must accept responsibility for the detection on fraud by management. The profession cannot, and it cannot be expected to, develop methods that will assure that every fraud, no matter how cleverly contrived, will be unearthed in the course of the audit, but it must develop means of increasing significantly the likelihood of detecting fraud [Public Oversight Board of the SEC Practice Section, AICPA, 1993, p. 42].

By identifying one of the conditions that may be decreasing the likelihood of attending to red flags and measuring its effect, this study has provided the profession with information that may assist in achieving the recommendations

of the board. In doing so, this dissertation is responsive to each of the three goals of cognitive research in auditing identified by Hogarth [1991]--1) to advance understanding of how auditors perform judgment and choice tasks; 2) to provide some measurement of how well they perform these tasks; and, 3) to suggest ways of improving performance. By examining performance on dual-tasks and explaining this behavior from a cognitive perspective, each of these objectives may be advanced.

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APPENDIX A

TOP-RATED SENIOR SUCCESS FACTORS AT A MAJOR ACCOUNTING FIRM

This table lists the top 19 out of 122 factors included on a survey of audit seniors who had been identified as successful by a major accounting firm. Survey respondents were asked to rate 122 factors that were identified as possibly contributing success as an auditor in the firm. All ratings were provided on a five point scale. The averages represent the average of the ratings supplied by all respondents. The factors considered to be closely related to the topic of this dissertation are shown in bold.

| | |
|--|------------|
| Skill in offering helpful and meaningful suggestions to coworkers/clients | 4.7 |
| Ability to work effectively under pressure (e.g., tight deadlines, etc.) | 4.6 |
| Ability to organize work and prioritize activities | 4.6 |
| Ability to adapt to considerable pressure from deadlines and heavy workload | 4.5 |
| Ability to handle several tasks at one time | 4.5 |
| Willingness to respond quickly and with a sense of urgency to meet client needs | 4.5 |
| Willingness and a flexibility to adjust to multiple demands, shifting priorities, ambiguity, and rapid change | 4.4 |
| Skill in managing own workload, and managing budgets/timetables to maximize engagement economics | 4.4 |
| Willingness to routinely work 50 hours or more a week during certain time periods | 4.4 |
| Ability to work and get along with client representatives and other [Firm] team members | 4.4 |
| Ability to see the "big picture" in addition to the details of a particular task | 4.3 |
| Willingness to persevere on assigned tasks in the face of obstacles or "roadblocks" | 4.3 |
| Ability to plan work for self and provide guidance to others on a short-term (i.e. daily) basis | 4.3 |
| Willingness to demonstrate a commitment to quality and continuous improvement in client service | 4.3 |
| Willingness to assume a leadership role on projects | 4.3 |
| Willingness to set high performance standards | 4.3 |
| Doing more than the minimum | 4.3 |
| Willingness to do things without being asked | 4.3 |
| Demonstrating a professional image/appearance/demeanor when working with clients | 4.3 |

APPENDIX B

DOCUMENTATION OF THE PRETESTING PROCESS

This appendix details the nature of each pretest conducted and the major changes made as a result. The minor changes and the rationale for each of the changes is omitted in the interest of presenting a more parsimonious account of the process.

Original Instrument:

McDaniel's written materials were altered minimally. The only changes made were to expand the auditors' responsibilities to include the detection of irregularities rather than just errors. The audit program related the documentation requirements more explicitly than McDaniel's did. The data was altered significantly to include the misstatements of the reserve record. Initially, all of the customers were of equal size and ten customers contained consistent omissions of overstocked inventory from the reserve (rather than the two that were ultimately reported erroneously).

Pretest # 1:

Subjects: Ten senior-level or graduate students divided into high and low time pressure conditions.

Results:

- * None of the students noted the consistent reserve item omissions for any of the ten customers.
- * Several noted that the reserve was understated, but that was just due to the excessive number of exceptions included in the sample (i.e., they sampled one item from many of the customers with consistent omissions but did not notice systematic nature of the other omissions outside of the sample).
- * The debriefing process revealed that students were confused by the policy for valuing the reserve.

Alterations of the Instrument:

- * The Inventory Reserve Record was renamed the Reserve for Slow-Moving and Overstocked Inventory Record. The policy for valuing the reserve was clarified to reflect the effects of an omission on inventory and net income.

Pretest #s 2a and 2b:

Subjects: Four and three auditors, respectively, in the low time pressure condition.

Results:

- * The auditors' performance was essentially the same as the students in pretest # 1 (on the subsidiary task).
- * Several of these auditors suggested that the policy for valuing the reserve may be overly restrictive; they believed that there was probably a legitimate reason for the omission of items from the reserve that was noted in their samples. Discussions with these auditors revealed that they believed that, by documenting that the sample indicated a material misstatement due to reserve item omissions, they did not see the need to investigate the area further.
- * They also indicated that the omission of items from the finished goods inventory was confusing and that they could generate no reasonable explanation for these items.

Alterations of the Instrument:

- * Based on discussions with these auditors and meetings with two audit partners, statements were added that:
 - * discussed environmental factors (e.g., increased competition, slower inventory turnover, etc.),
 - * established the policy for valuing the reserve as an industry standard, and
 - * increased the strength of the wording of the statements emphasizing the dual nature of the auditor's task.
- * The number of customers for whom all items were overstocked but omitted from the reserve was reduced from ten to two. The distribution of customer sizes was changed from a uniform distribution to one in which there were 35 small customers, 20 medium sized customers, and five very large customers. The two "red flag" customers were very large customers. This had the effect of making it relatively unlikely that the samples chosen to execute the detailed tests would reveal an excessive number of omissions.
- * The number of finished goods omission items was reduced from 8% to 1%. This lowered the required sample size of the inventory test count and eliminated the "dead end" investigation of the omissions that were not realistic types of errors and therefore had no plausible explanation. The reduced sample size for this step allowed ten minutes to be trimmed from the time pressure conditions.
- * Customer totals were added for the average monthly use and units on hand. This was done to increase the strength of the psychophysical and collative properties of the cues indicative of possible irregularities present.

Pretest # 3:

Subjects: Seven auditors in the low time pressure condition.

Results:

- *One auditor detected and documented the situation involving one of the two "red flag" customers. It appeared that this auditor first completed the assigned procedures and then went back and looked for other things to do. The others did not make any documentation of the situation (although a discussion revealed that one other auditor saw something unusual but did not pursue it).
- * The changes designed to eliminate the consideration of finished goods inventory omissions and the questioning of the policy for valuing the reserve appeared to be successful.

Alterations of the Instrument:

- * Customer inventory turnover ratios were added to the finished goods inventory record. No mention of the ratio was made anywhere else on the audit program or in other experimental materials in order to avoid indicating that audit procedures needed to be executed on these ratios.
- * The audit program was altered to emphasize the importance of reviewing for items that appear unusual during the execution of detailed audit procedures.
 - * The way time pressure was communicated was changed by assigning budgeted times for each audit step. This had the effect of making it clearer earlier whether or not the task would be completed on time; thus allowing those under low time pressure to operate under lower arousal earlier. The pretest auditors appeared to be intense during the execution of procedures and very relaxed in the period after procedures were completed. They were pressing on throughout because they did not know how long the next procedure was going to take.
 - * The importance of reviewing for unusual items while executing the audit program steps was emphasized on the audit program. The wording of this statement was consistent with audit programs used in professional practice.
 - * The dual nature of the auditors role was reemphasized in the audit program instructions.
- * During experimental questionnaires were developed to be used to measure concurrent processing of the indicators of financial fraud.

Pretest # 4:

Subjects: Two faculty members one under low time pressure and one under undefined time pressure (no time limit was set for this subject but it was apparent that the task was completed very quickly).

Results:

- * Neither detected the red flags in the data, but one noted several of the indicators present in the environment.
- * Discussions revealed that the inventory turnover ratio (which was abbreviated ITO in the records without any legend indicating what ITO stood for) was not clearly understood.

Alterations of the Instrument:

- * The customer subtotals (including ITO) were placed in bold type to strengthen the psychophysical properties associated with these cues.
- * The language of the red flags in the contextual information was strengthened.

Pretest # 5:

Subject: One auditor in the low time pressure condition.

Results:

- * This auditor noted the low ITO ratios, circled them, and wrote "investigate" next to them but did not perform any follow-up investigation.

Alterations to the Instrument:

- * The importance of following-up on any unusual items, customers, products, or amounts was emphasized in the task instructions and the audit program.
- * An explanation of the ITO was placed on the front page of the inventory records as a note made by another auditor. The ITO was linked directly to the column headings on the records. It was emphasized that low levels of the ITO ratio were indicative of a build up of units on hand relative to the average monthly usage. This change was made to strengthen the ecological properties of the ITO cues.
- * Many passages in the written materials were evaluated and adjusted where it was necessary to clarify ambiguous statements.

Pretest #s 6a and 6b:

Subjects: Four and two auditors, respectively, all in the low time pressure condition except one auditor in 6a in the high time pressure condition.

Results:

- * Three of the five in the low time pressure condition made some indication that there was something unusual with the "red flag" customers. One of these thoroughly documented the situation linking it to the increased competition.
- * The auditor under high time pressure did nothing other than execute the assigned audit procedures and made no extra marks on the materials.

Alteration to the Instrument:

- * Some additional questions were added to the post-experimental questionnaire.

Pretest # 7:

Subjects: Eight graduate students in an advanced auditing class. Six were under low time pressure and two were under undefined time pressure (although they appeared to rush through it).

Results:

- * Three of the students (all under low time pressure) thoroughly documented the situation involving the "red flag" customers.

Alteration of the Instrument:

- * The description of an additional incentive and opportunity to engage in irregularities was added to the task instructions.

APPENDIX C
TEST INSTRUMENT
TASK INSTRUCTIONS

Task Requirements

You are assisting in the current year's inventory work for the University Division of CEA Co., a large, highly diversified manufacturer who has been audited by your firm for the last four years. Because of the diversity between the divisions of CEA Co., each has a high degree of autonomy. Corporate influence comes mainly in the form of financial statement based incentives and resource allocations. The Division supplies CEA's 60 university customers with 25 different products (e.g., sweatshirts running shorts, caps, etc.) that include the individual schools' logos. You have been assigned to complete a portion of the Division's audit of Finished Goods Inventory and the related Reserve for Slow-moving and Obsolete Inventory. You are to examine the client-prepared records for certain bookkeeping errors and irregularities and to document your findings within the time allotted.

Any potential errors or irregularities are related to inventory and reserve valuation and completeness. You have a dual role to play in this task just as you do in actual audit situations. You have the responsibility to achieve the audit objectives by

- * executing assigned audit procedures as effectively and efficiently as possible and
- * being attentive to any indicators of possible irregularities that may be present in the data.

Your responsibility for following up on these procedures and documenting the results of these procedures is the same as it would be in an actual audit situation.

Client and Audit Information

All information needed to conduct your examination is provided either by the client or your firm's engagement office. Just as in a normal audit situation, you should study and obtain an understanding of all information prior to executing the audit procedures. Time has been allocated for this task in the audit program. You will have the following information:

- I. CEA Co. University Division Records (prepared by client):
 - (A) year-end Finished Goods Inventory Record as of 3-31-93 (arranged by customer with average monthly use, units on hand, and unit cost information for each product code; also reported are inventory turnover ratios for each customer--labelled ITO on record--and subtotals for each customer of average monthly usage and units on hand--labelled TOTAL)
 - (B) year-end Reserve for Slow-moving and Obsolete Inventory Record as of 3-31-93.
 - (C) catalog list of approved product codes with their current costs. (Different logos do not vary in cost. Therefore, items with the same product code but different university logos should have the same unit cost.)
 - (D) client statement of CEA's policy for valuing the Reserve for Slow-moving and Obsolete Inventory (with auditors' notes on the policy below).

II. Audit Materials (prepared by engagement office):

- (A) excerpts from the engagement office's letter about the University Division:
- (1) statement of audit objectives,
 - (2) description of the client's operating environment,
 - (3) expected population error rates (by type) based on sample error rates observed by your firm over the past four years.
- (B) details of work performed (or to be performed) at the Division by other auditors in your firm (you may rely on this work in your examination):
- (1) year-end inventory test counts,
 - (2) audited average monthly usage values (These values are based upon net sales of each item over the first three quarters of the fiscal year. The audit of these values was conducted during interim testing procedures.)
 - (3) extensions and footings of the inventory and reserve records (to be performed by other auditors after your examination). Note: the totals of the records listed in I., above, have been traced to the general ledger (the totals are not provided, however).
- (C) an audit program designed to assist your examination for errors.

Documentation Requirements

In order to accurately evaluate the results of your efforts, it is important to document your work. Blank columns are provided in the various inventory records to show your work. The audit program will instruct you as to the column in which you should show your work for each particular audit procedure. For each characteristic of the inventory or reserve item selected for examination,

- (1) circle the item's characteristic being tested (e.g., circle the selected item's unit cost),
- (2) indicate the accuracy of the characteristic by marking in the labeled column a check mark (if the characteristic is correct) or an X (if the characteristic is in error).

Additional space is provided on the right-hand side of each page of the client-prepared materials for you to document any work done in addition to that required by the audit program or to document any other situation which you may feel requires further attention. An additional page is also provided for you to provide more detailed documentation.

Importance of Your Work

Your ability to accurately identify any errors or irregularities in the client's inventory records is of interest to your supervisors. It is important to work to achieve the stated objectives as accurately and efficiently as possible.

Questions

Please take a few minutes to review these instructions. If you have any questions, ask them before we begin the inventory exercise. Once your time begins, no questions can be answered. Your time will begin when you are instructed to open the inventory materials.

STATEMENT OF AUDIT OBJECTIVES

For the portion of the inventory audit that you are performing, you have the following two objectives:

- * To be 90% confident that the true error rate for each error type below does not exceed the tolerable error rate of 15%. The audit procedures detailed in the audit program have been designed to allow you to achieve this objective.
- * To reach an overall conclusion as to the reasonableness and the fairness of the items and amounts presented and disclosed in the financial statements. Your review for items, amounts, products, and customers that appear unusual (which is to be executed concurrently with the audit program steps) should allow you to achieve this objective.

To obtain these objectives, you should execute your audit procedures as effectively and efficiently as possible while being attentive to the possibility that errors or irregularities may exist in the data.

CLIENT'S OPERATING ENVIRONMENT

(excerpt from audit planning memo)

The fourth quarter entry of a new, major competitor in the market has affected the demand for the products of the University Division of CEA Co.. This may have the effect of making it more difficult to retain existing customers. Our preliminary review of year-end financial information has indicated that profitability is down and inventory is up. Analytical procedures revealed that aggregate inventory turnover (ITO) is lower, meaning that the client has had to hold onto its inventory longer. As a result, the number of units on hand is greater relative to the average monthly usage than it has been in the past. At this time, it is unclear as to whether this situation is a result of an overall slow-down or a situation involving specific items, products, or customers. We should be attentive to any detailed data that might provide information on this situation. The inventory area has been identified as more risky this year than in prior years.

EXPECTED POPULATION ERROR RATES

Over the past four years a number of bookkeeping errors have been detected in this portion of the year-end audit of inventory and associated reserve for overstocked and slow-moving items for this CEA Co. Division. All errors relate to valuation and completeness. The table below summarizes the expected population error rates for the current year's audit based on sample results of the past four years' observed frequencies for these types of inventory errors. The samples in the audit program are designed to achieve the required level of confidence given these expected population error rates.

| Assertion | Type of Error | Expected Population Error Rate |
|--------------|--|--------------------------------|
| Valuation | Finished Goods Inventory unit pricing | 9% |
| | Reserve for Slow-moving and Obsolete Inventory unit pricing | 5% |
| Completeness | Finished Goods Inventory item omission | 1% |
| | Reserve for Slow-moving and Obsolete Inventory item omission | 3% |

INVENTORY AUDIT PROGRAM INSTRUCTIONS

- * You should use this program to assist in your examination for errors and irregularities in the client's Finished Goods Inventory and Reserve for Slow-Moving and Obsolete Inventory Records
- * While the procedures in this program are designed to provide the appropriate level of confidence that the true population error rate for each error type does not exceed the tolerable error rate, you should be attentive to any errors or irregularities that may exist but may not show up in the sample.
 - * Execute the audit procedure of "reviewing the records for items, amounts, products, and customers that appear unusual" as you perform each audit program step.
 - * Just as it would be in an actual audit situation, execution of the audit program steps without being attentive to unusual items would be inappropriate.
- * Use a "haphazard" sample selection technique to pick the individual items to be investigated.
- * For the sampled items, you should be concerned with the frequency and nature of any errors, rather than direction or monetary effect. You should consider all aspects of any unusual items noted in your review, however.
- * Your responsibility for following up on these procedures and documenting the results of these procedures is the same as it would be in an actual audit situation, given the constraints on the information available. Please attempt to conduct all follow-up procedures and provide documentation as you complete each step.
- * Performance of the audit procedures within the times noted in the "Time Bud." column next to each audit step will allow you to complete the task within the total time allotted for the audit task.

INVENTORY AUDIT PROGRAM

| Concurrent with all audit program steps. | | | Review records for items, amounts, products, and customers that appear unusual. Your initial on any of the other audit program steps indicates that you have performed such a review. |
|--|-----|---------|---|
| Time (75 min. total) | | Initial | Audit Program Step |
| Bud | Act | | |
| 13 | | | Study and obtain an understanding of all client information, records, and audit program steps. |
| 14 | | | Using the test count sheet from the physical inventory observation procedures (previously performed by your firm's auditors), trace each item physically counted to the units on hand reported in the Finished Goods Inventory. (Documentation: Circle units on hand. Place a check or an "X" in the column labelled "FINISHED GOODS OMISSION.") |
| 13 | | | From each page of the Reserve for Slow-moving and Obsolete Inventory, select a sample of five items. For each sample item, verify that the per unit cost agrees with the approved product code-current cost list. (Documentation: Circle unit cost. Place a check or an "X" in the column labelled "RESERVE PRICING.") |
| 17 | | | From the Finished Goods Inventory, select one item from 25 of the 30 pages. For each sample item, calculate whether the quantity on hand exceeds 3 times the monthly usage. Any items having in excess of three month's usage should be traced to the Reserve to verify that the <u>excess</u> units are properly included. (Documentation: Circle the average monthly usage for each item selected. Place a check or an "X" in the column labelled "RESERVE ITEM OMISSION." Place an "X" only if UNITS ON HAND > 3 * AVG MONTHLY USE AND the item is not included on the reserve) |
| 18 | | | From the Finished Goods Inventory, select three items from each odd-numbered page and two items from each even-numbered page. For each sample item, verify that the recorded per unit cost agrees with the approved product code-current cost list. (Documentation: Circle unit cost. Place a check or an "X" in the column labelled "FINISHED GOODS PRICING.") |

POLICY FOR VALUING THE RESERVE FOR SLOW-MOVING AND OBSOLETE INVENTORY

In order to show its inventory at the lower of cost or market, CEA Co. determines the value of its year-end inventory at each division by reducing the total book value of Finished Goods Inventory by the total Reserve for Slow-Moving and Obsolete Inventory value. An entry is recorded in the Reserve for any finished goods inventory item whose quantity on hand exceeds 3 times its average monthly usage. The EXCESS quantity (i.e., supply greater than 3 months usage) is to be recorded on the Reserve for Slow-moving and Obsolete Inventory at the current unit cost.

(For example: Suppose a particular item in the Finished Goods Inventory reports 90 units on hand with an average monthly usage of 25 units and a current cost of \$2 per unit. The Reserve for Slow-moving and Obsolete Inventory should include a corresponding entry for EXCESS quantity of 15 units [90 - (25 x 3)] at the item's \$2 unit cost.)

Auditor's Notes on Client Policy

The following entry should be made in the inventory records to establish the reserve for the above example:

| | |
|------------------------------------|--------------------------|
| Holding Loss | 30 < == Income Statement |
| Reserve for Slow-moving & Obsolete | |
| Inventory (logo num, prod code) | 30 < == Contra-asset |

Similar entries should be made for all other items whose quantity on hand exceeds three times the average monthly usage. The division's chief financial officer initiates and authorizes the recording of these entries based upon a review of inventory records. The reserve record displays all of the items for which such an entry was made at year-end.

This method of valuing inventory is very well established and accepted in the industry. All of CEA Co.'s major competitors use this method of establishing the reserve for slow-moving and obsolete items. Deviations from this policy would affect the comparability of CEA Co.'s financial statements to those of its competitors.

APPROVED PRODUCT CODES AND UNIT COSTS LIST (as of 3/31/93)

(Prepared by Client) (Verified by Auditors)

| PROD CODE | UNIT COST (\$) | PROD CODE | UNIT COST(\$) |
|-----------|----------------|-----------|---------------|
| A | 8.42 | N | 7.49 |
| B | 9.24 | O | 7.30 |
| C | 7.13 | P | 9.24 |
| D | 4.36 | Q | 7.72 |
| E | 4.08 | R | 8.49 |
| F | 6.82 | S | 8.13 |
| G | 1.34 | T | 2.15 |
| H | 5.68 | U | 9.18 |
| I | 2.49 | V | 9.54 |
| J | 8.30 | W | 9.37 |
| K | 3.94 | X | 1.66 |
| L | 4.64 | Y | 7.39 |
| M | 5.61 | | |

APPENDIX D

SUMMARY OF DIFFERENCES BETWEEN MCDANIEL'S AND THE DISSERTATION'S TEST INSTRUMENTS

| Area of change | McDaniel's study | Dissertation |
|--------------------------------|--|--|
| Auditor Responsibility | Auditors were required to execute the test of details task. With no interpretation of results. | Auditors were required to be attentive to any unusual items requiring additional investigation while executing the audit test of details task. They were informed that their responsibility to follow up on the procedures and document the results of the procedures was the same as it would be in a normal audit situation. |
| Red Flags | None. The errors seeded in this task were random pricing transposition errors, random omissions from the reserve, and random omission from the finished goods inventory records. | Indicators consisted of environmental or contextual factors and task data factors. The following environmental or contextual factors were present: 1) the inventory turnover ratio for the division was lower than in previous years, 2) the total inventory was quite high, 3) division profitability was low, 4) competition for the division's customers was increasing, 5) the division may have difficulty in retaining customers, 6) the overall riskiness of the inventory area was assessed to be quite high, 7) there was centralized authority within the division, and 8) the division was an autonomous unit in a highly diversified company which distributed resources and incentives based on financial statements. The task data indicators consisted of frequent and systematic omissions from the reserve for the two largest customers of the division. The task data was also altered by reducing the number of omissions from the finished goods record to reduce confusion about apparently unexplainable errors. |
| Client policies and procedures | Explained policy for establishing the reserve inventory. | The title of the inventory reserve listing was changed to "Reserve for Slow Moving and Obsolete Inventory" to be more descriptive. The policy for establishing an item on the reserve was more clearly explained to allow auditors to realize the financial statement effects of omissions from the reserve. The policy was described as being well established within the industry and vital for the comparability of financial statements. |

APPENDIX E

SAMPLE EXPERIMENTAL QUESTIONNAIRE

Based on the data you have reviewed and your auditing judgment, what is the likelihood that:

- a) there is a material misstatement involving the omission of items from the Finished Goods Inventory Record?

| | | | | | | |
|--------------------|---|---|---|---|---|----------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| remotely likely | | | | | | very likely |

Have not begun investigation of this area _____

- b) there is a material misstatement involving the omission of items from the Reserve for Slow-moving and Obsolete Inventory Record

| | | | | | | |
|--------------------|---|---|---|---|---|----------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| remotely likely | | | | | | very likely |

Have not begun investigation of this area _____

- c) there is a material misstatement involving the pricing of the units in the Reserve for Slow-moving and Obsolete Inventory Record

| | | | | | | |
|--------------------|---|---|---|---|---|----------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| remotely likely | | | | | | very likely |

Have not begun investigation of this area _____

- d) there is a material misstatement involving the pricing of the units in Finished Goods Inventory

| | | | | | | |
|--------------------|---|---|---|---|---|----------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| remotely likely | | | | | | very likely |

Have not begun investigation of this area _____

- e) there are irregularities (intentional misstatements) present in the data

| | | | | | | |
|--------------------|---|---|---|---|---|----------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| remotely likely | | | | | | very likely |

- f) financial reporting fraud (intentionally misleading financial statements) is present

| | | | | | | |
|--------------------|---|---|---|---|---|----------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| remotely likely | | | | | | very likely |

APPENDIX F
PARTICIPANT AUDITOR DOCUMENTATION OF
THE RED FLAGS

Subject # 05:

Time Allotted: 65 minutes

Reported Time Taken: 41 minutes

Detection Performance:

First measurement (notice anything unusual): Detected

Wrote "Obsolete?" next to the low inventory turnover ratio for one of the two potentially misstated customers.

Second measurement (understand misstatement): Not Detected

Subject # 56:

Time Allotted: 55 minutes

Reported Time Taken: 46 minutes

Detection Performance:

First measurement (notice anything unusual): Detected

Circled the inventory turnover ratio and wrote "Very low!" next to it for both of the two potentially misstated customers.

Second measurement (understand misstatement): Not Detected

Subject # 58:

Time Allotted: 75 minutes

Reported Time Taken: 57 minutes

Detection Performance:

First measurement (notice anything unusual): Detected

Second measurement (understand misstatement): Detected

On the Additional Documentation page this auditor wrote, "Inventory turnover rate for Univ. logo #s 108 and 148 are low in relation to other customers. Possible obsolescence issue in addition to amounts already recorded."

In the Post Experimental Questionnaire, this auditor identified the low inventory turnover ratios for the two customers and indicated that there should be an independent calculation of the reserve amount.

Subject # 62:

Time Allotted: 75 minutes

Reported Time Taken: 72 minutes

Detection Performance:

First measurement (notice anything unusual): Detected

Second measurement (understand misstatement): Detected

On the Finished Goods Inventory Record next to customer number 148 this auditor wrote, "Additional testing done on LOGO 148 due to large quantities on hand." Several calculations were included next to this customer indicating that this auditor had generated an estimate of the amount of the misstatement of the reserve. These calculations indicated that there was a 32,236 unit excess resulting in a possible \$219,746 adjustment of the reserve.

These calculations were elaborated upon on the Additional Documentation page in which the comment was made, "It looks as if several items in LOGO 148 & 108 have been left off of the reserve listing (see low ITOs). Approximate misstatement = \$200,000 in logo 148. We should have client compute actual amount of misstatement and propose adjusting JE to correct. Number of errors indicates results will exceed tolerable error rate of 15%.

The audit program indicated that this auditor spent over 45% of the total time on the reserve item omission step. An exit interview confirmed that the analysis of the reserve item omission was done during the execution of the audit step which led to the discovery.

The two customers were identified again in the Post Experimental Questionnaire.

Subject # 22:

Time Allotted: 75 minutes

Reported Time Taken: 53

Detection Performance:

First measurement (notice anything unusual): Detected

Second measurement (understand misstatement): Detected

Next to both of the potentially misstated customers, this subject wrote, "Most of these items require a reserve."

On the Additional Documentation page this subject wrote, "Did a review of average monthly usage and total units on hand. Noted logo numbers 112 and 117 are over reserved and very few of these appear on the slow moving and obsolete sheet. Thus, reserve may be misstated." This was the only note appearing on this page.

The initial detection of the items appeared to occur during the execution of the audit steps. The additional documentation was done during the last ten minutes of the task (as indicated by writing utensil color).

Subject # 26:

Time Allotted: 75 minutes

Reported Time Taken: 69

Detection Performance:

First measurement (notice anything unusual): Detected

Second measurement (understand misstatement): Detected

For one of the two potentially misstated customers, the "Reserve Item Omission" column contained Xs next to each of the items improperly excluded from the reserve. In the comments area next to this customer was the comment "Not on reserve listing" for each item with an X. The writing utensil color indicated that this analysis was done concurrent with the execution of the audit program step.

On the Additional Documentation page were the following comments:

"It is questionable whether we can rely on the clients FG inventory listing for amt. extensions as there are numerous occasions where the improper unit cost was used. Also we need to follow up on why our test count was diff. that the listing—may indicate that we can't rely on the listing at all."

"The reserve calculation for slow/obsolete will need to be redone. First, some items are inappropriately excluded. Second, amts (per unit cost) are incorrect. Third, FG listing is suspect (see above)."

APPENDIX G

OPTIMAL DOCUMENTATION OF THE RED FLAGS

"Optimal" Documentation

There appears to be a material misstatement with regard to the completeness assertion for the Reserve for Slow-Moving and Obsolete Inventory. Based on the audit procedures applied thus far, the misstatement appears to be intentional and quite possibly an instance of financial fraud. The support for these conclusions is outlined below.

The units on hand for all products for the customers numbered 108 and 148 are in excess of three times the average monthly usage. Only an average number of products for these two customers are reported on the inventory reserve listing (approximately five for each customer out of 25 that should be on the reserve). Given the explicit language about the policy for valuing the reserve (that deviations from the policy of including on the reserve all items with an excess of three times the average monthly usage would affect comparability of the financial statements), the financial statements are, at a minimum, materially misstated.

It should be noted that it is possible that large sales occurring just prior to year-end may have gone unrecorded, thus reducing the likelihood that the misstatement is due to irregularity. The follow-up investigation should include procedures to determine whether that is the case. Because of the significance of such a transaction, should it be proposed to exist, the auditors should be highly skeptical of any evidence provided and should take special care to ensure that the timing of the reduction on the inventory coincided with the recognition of the sale. The following discussion details why it is more likely that the misstatement is a result of financial fraud rather than a failure to record large sales.

First, it is clear that the following incentives to commit financial fraud are present in the environment:

- * The University Division is operating under corporate financial statement based incentives and resource allocations.
- * Competition is increasing with the fourth quarter entry of a new, major competitor.
- * The new competition may make it difficult to retain existing customers.
- * Profitability is down. Note that this is especially relevant given that incentives and resource allocations are based on the financial statements.

The following are opportunities to commit financial fraud:

- * The University Division is fairly autonomous.
- * The diversity of the corporation may make it difficult to closely monitor the Division.
- * The Division's CFO initiates and authorizes the recording of items on the inventory reserve record. It seems unusual that a task which should be routine is given to such a high ranking official who is most likely not subject to review.

The following points highlight some of the reasons why the potential financial fraud may have perpetrated:

- * The failure to make the entry to record items on the reserve has the effect of overstating net income and total assets, two factors which are probable bases for financial statement based incentives.
- * The two customers in question are two of the company's five largest customers.
- * The fact that the number of units on hand is in excess of three times the average monthly usage for all products may indicate that the client is not selling to these two customers. That is, they may have lost these customers. The size and timing of the overstatements indicate that the loss of these customers may have occurred in the fourth quarter.
- * The average monthly usage values were audited during interim testing procedures based on sales over the first three quarters of the fiscal year. These procedures would not be sensitive to the loss of customers occurring during the fourth quarter.
- * The sizes of the two potentially lost customers may make it difficult for the Division to stay in business. Leaving the excesses off of the reserve may have been an attempt to conceal a potential going concern problem from the auditors and others.

Recommendation:

It is recommended that for the customers in question (and possibly the other three large customers) an extensive review of fourth quarter sales for the year under audit and first quarter sales for the subsequent year should be undertaken. This review should incorporate the analysis of sales invoices and cash receipts with a very high level of skepticism to determine if goods are currently being sold to these customers. If the client can produce apparently appropriate documents for these customers, independent confirmation with the customer of the representations included therein should be considered. If these audit procedures lead to the conclusion that these customers have been lost and that the goods are obsolete, the matter should be communicated to the audit committee as a likely financial fraud. In light of the new information on the integrity of management, the scope of the entire audit should be reevaluated with special attention given to evidence obtained through inquiry of top management.

VITA

Robert L. Braun is a Ph.D. candidate in Accounting at the Louisiana State Unveristy and Agricultural and Mechanical College. Mr. Braun received his Bachelor of Science degree in Accounting at Kansas State University, Manhattan, Kansas in 1988.

As a graduate student at Louisiana State University, Mr. Braun was honored with the Lloyd F. Morrison Award for teaching and the Business Partnership Award for excellence in teaching as a graduate assistant. As a temporary instructor at Kansas State University, Mr. Braun's responsibilities have included such activities as teaching senior-level and graduate-level classes, developing new senior-level and graduate-level classes as a part of the new accounting curriculum funded by the accounting education change commission, conducting research, advising students, participating in curriculum change assessment activities, and serving on committees.

Robert and his wife, Susan, reside in Manhattan, Kansas and are the parents of two boys, Paul and Jacob.

DOCTORAL EXAMINATION AND DISSERTATION REPORT

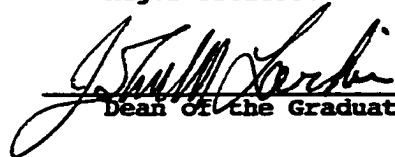
Candidate: Robert L. Braun

Major Field: Accounting

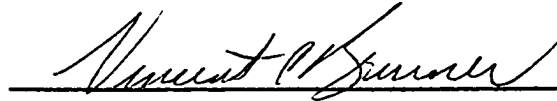
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to Red Flags in a Dual-Task Environment

Approved:

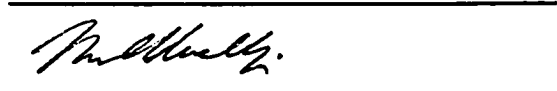

Major Professor and Chairman

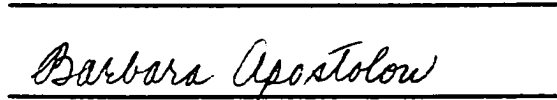

Dean of the Graduate School

EXAMINING COMMITTEE:









Date of Examination:

10/28/94